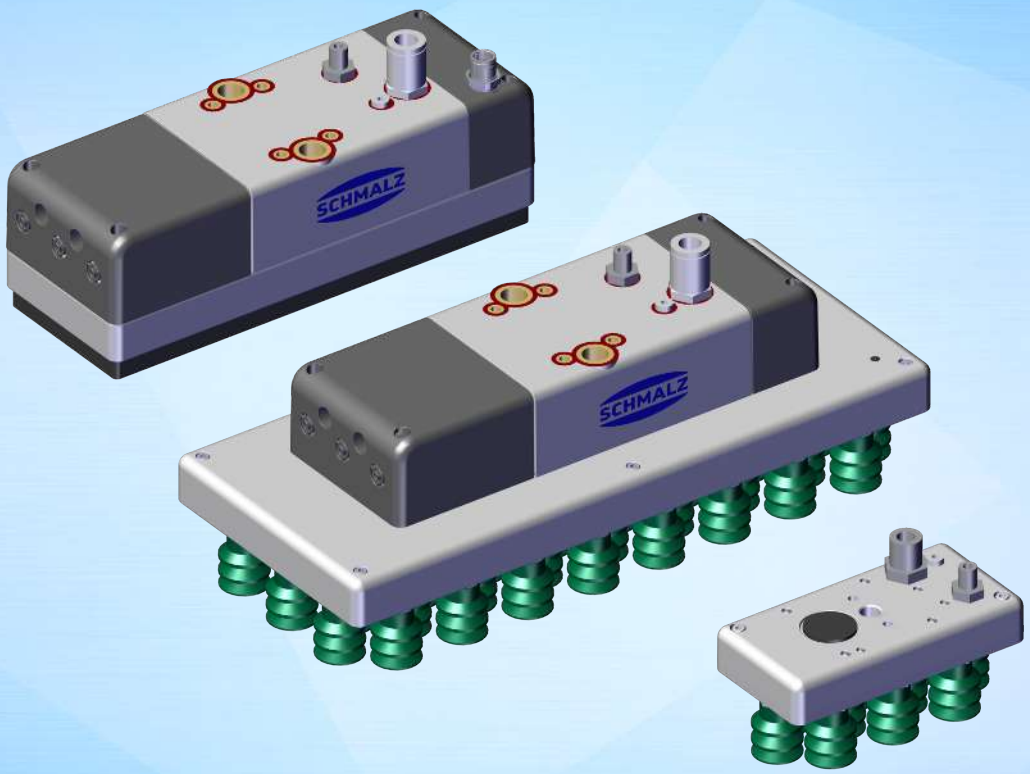

Assembly Instructions

Gripping System FQE

WWW.SCHMALZ.COM

EN-US · 30.30.01.02497 · 06 · 04/25

Note

The Assembly instructions were originally written in German. 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.

Published by

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www.schmalz.com/salesnetwork

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W

1 Important Information

1.1 Warranty

No suction tests with sample workpieces were carried out with this vacuum gripping system. The handling function in the process cannot be guaranteed.

J. Schmalz GmbH, therefore, assumes no responsibility for the function of the product in the 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 suction cup sizes, additional suction cups, a higher suction rate or modifications to the configuration may be necessary.

1.2 The technical documentation is part of the product

1. For problem-free and safe operation, follow the instructions in the documents.
2. Keep the technical documentation in close proximity to the product. The documentation must be accessible to personnel at all times.
3. Pass on the technical documentation to subsequent users.

⇨ Failure to follow the instructions in these Assembly instructions may result in injuries!

⇨ Schmalz is not liable for damage or malfunctions that result from failure to heed these instructions.

If you still have questions after reading the technical documentation, contact Schmalz Service at:

www.schmalz.com/services

1.3 Note on Using this Document

J. Schmalz GmbH is generally referred to as Schmalz in these Assembly instructions.

These Assembly instructions contain important notes and information about the different operating phases of the product:

- Transport, storage, start of operations and decommissioning
- Safe operation, required maintenance, rectification of any faults

The Assembly instructions describe the product at the time of delivery by Schmalz.

The displayed figures are only examples. Depending on the particular design, they can differ from the product.

1.4 Symbols

This symbol indicates useful and important information.

✓ This symbol represents a prerequisite that must be met before an action is performed.

▸ This symbol represents an action to be performed.

⇨ This symbol represents the result of an action.

Actions that consist of more than one step are numbered:

1. First action to be performed.
2. Second action to be performed.

1.5 Type Plate

The type plate is permanently attached to the product and must always be clearly legible.
It contains product identification data and important technical information.

The QR code enables access to the digital technical documentation for the product.

▸ For spare parts orders, warranty claims or other inquiries, have the information on the type plate to hand.

1.6 Other Applicable Documents

Depending on the gripper configuration, the following documents must also be observed:

- Ejector module operating instructions
- Vacuum switch operating instructions

2 Fundamental Safety Instructions

2.1 Intended Use

The gripping system FQE (hereinafter referred to as the gripper or gripping system) is used for gripping and transporting airtight workpieces (hereinafter referred to as the load) with the aid of a vacuum.

The gripping system is integrated by the system integrator into an automated EOL palletizing process with lightweight robots (hereinafter referred to as an automated handling system) and is connected mechanically, electrically and pneumatically.

The gripper is only suitable for the following applications:

- Automatic operation
- Semi-automatic operation
- Human-robot collaboration applications

It is controlled via external signals.

Neutral gases in accordance with EN 983 are approved as evacuation media. Neutral gases include air, nitrogen and inert gases (e.g. argon, xenon and neon).

The gripper is not suitable for the following applications:

- Manual handling

The gripper must be operated only with the voltage or compressed air supply specified in the technical data.

The load must only be vacuum-gripped in the position defined in advance or on initial set-up of the product.

The gripping system is built in accordance with the latest standards of technology and is delivered in a safe operating condition; however, hazards may arise during use.

The maximum lift capacity must not be exceeded (> See ch. Technical Data).

2.2 Non-Intended Use

Schmalz accepts no liability for damage 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
- Lifting parts that are attached to the load
- Applying suction to building components, equipment or supporting surfaces
- Transport and through-suction of potentially explosive materials
- Applying suction to bulk materials (e.g. granulates)
- Applying suction to liquids.
- Evacuation of objects that are in danger of imploding
- Handling of damaged loads
- Use as a clamping device for workpiece processing

2.3 Warnings in This Document

Warnings warn against hazards that may occur when handling the product. The signal word indicates the level of danger.

Signal word	Meaning
⚠ WARNING	Indicates a medium-risk hazard that could result in death or serious injury if not avoided.
⚠ CAUTION	Indicates a low-risk hazard that could result in minor or moderate injury if not avoided.
NOTE	Indicates a danger that leads to property damage.

2.4 Personnel Qualifications

Unqualified personnel cannot recognize dangers and are therefore exposed to higher risks!

The system integrator must ensure the following points:

- The personnel must be commissioned for the activities described in these instructions.
- The staff must be at least 18 years of age and physically and mentally capable.
- The product must be operated only by persons who have undergone appropriate training.
- Personnel must receive regular safety briefings (frequency as per country-specific regulations).
- The product must be installed and maintained only by qualified electrical, pneumatic and mechanical specialists.

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 employees must observe the relevant industry-specific rules and regulations.

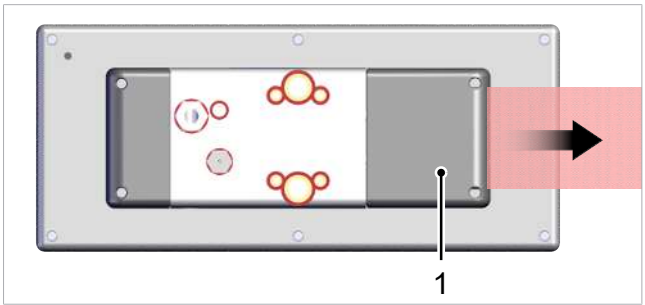
2.5 Danger Zone

Persons in the danger zone of the gripper may suffer life-threatening injuries.

The danger zone of the gripper includes the following areas:

- On the ejector exhaust air outlet.
- The area directly below the gripper and load.
- The area immediately surrounding the gripper and load.
- The working area of the automated handling system.

Versions FQE-X and FQE-V-X: Compressed air escaping from exhaust air outlet on the ejector (1):



⚠ CAUTION

Leakage of compressed air during installation and maintenance work

Bursting or release of compressed air lines

Risk of injury from powerful airflow, particles and noise.

Damage to hearing and eyes.

Risk of injury from compressed air hoses being slewn around.

- ▸ Deactivate the compressed air supply before installation and maintenance work.
- ▸ Wear ear protection and protective glasses.

2.6 Environmental and Operating Conditions

⚠ CAUTION

Dangerous* aerosols, dust, vapors, gases or solvents in the ambient air

Risk of injury from falling load due to damage to vacuum components (vacuum generators, vacuum supply hoses, suction cups, etc.)!

Danger of breathing difficulties due to hazardous substances that are sucked in and distributed by the vacuum generator.

- ▸ Before commencing work, ensure that the ambient air does not contain any hazardous substances.
- ▸ Make sure that there are no hazardous substances on the load that can be sucked in.
- ▸ If the ambient air is dusty, use a dust filter (particle size max. 5 µm).

⇨ *) Examples of hazardous substances: Acids, alkalis, conductive dusts, combustible media, etc.

⚠ CAUTION

Blockage of the vacuum system from sucking in liquids

Risk of injury from falling load!

- ▸ Do not pick up liquids or bulk materials.

The gripping system must be operated only under the following conditions:

- Ambient temperature and maximum relative humidity (> See ch. 4.1 General Parameters, p. 20).
- The contact surfaces between the suction cup and load must be free from humidity, moisture, dirt, dust, oil or other substances that may reduce friction levels.
- The gripping system must be sufficiently dimensioned for the loads to be lifted.

The gripper must **not** be operated under the following conditions:

- Using the product in a potentially explosive environment may cause an explosion.
- Using the product in an environment with acidic or alkaline media may cause damage to load-bearing parts.

- ▸ If in doubt, consult Schmalz before the start of operations.

2.7 Personal Protective Equipment

To avoid injury, always use appropriate protective equipment that is suitable for the situation. The protective equipment must meet the following standards:

- Protective work shoes in safety class S1 or higher
- Sturdy work gloves in safety category 2231 or higher
- Industrial helmet
- Ear protection class L or higher
- Eye protection class F
- Hair net
- Closely fitting clothing

2.8 Technical Condition / Manufacturer's Liability

If the product is operated while in a defective state, safety and function will be impaired.

- If the operating behavior changes, check the gripper for faults. Rectify faults immediately!

Schmalz assumes no liability for consequences if the following points have not been complied with:

- Only operate the gripper when in perfect working order as originally delivered.
- Follow the maintenance plan (> See ch. Maintenance).
- Only use original Schmalz spare parts and accessories.
- Do not independently modify or alter the gripper.
- Safety features must not be disabled under any circumstances.

2.9 Responsibility of the Integrator

The system integrator must carry out a risk assessment of the entire system for all operating modes and define the danger zone precisely. In doing so, country-specific provisions and regulations must be observed.

- Ensure that the gripper cannot be started up by unauthorized persons.
- During maintenance or repair work, ensure that the gripper cannot be operated.
- In automatic operation, ensure that the danger zone is cordoned off to prevent persons from entering (protective fence or sensor system).
- In other operating modes, ensure that no unauthorized persons or animals are present in the danger zone.
- Ensure that collisions with the surrounding environment and objects are avoided to prevent the load from breaking off.
- Before handling unfamiliar loads, carry out tests to ensure safe operation.
  - The load to be lifted is sufficiently rigid so that it cannot be damaged during gripping and handling.

2.10 Country-Specific Regulations for the Operating Company

1. Observe the country-specific regulations regarding accident prevention, safety testing and environmental protection.
2. The gripper is used in combination with an automated handling system (gantry/robot). Ensure that the appropriate country-specific regulations and safety regulations are adhered to.

3 Product Description

3.1 Operating Principle

The gripping system uses a vacuum to lift the defined products. It can handle one or more loads of different sizes. The maximum load-bearing capacity of the gripping system is achieved when the entire surface of each of the suction cups or the sealing plate is placed over an airtight workpiece with a smooth surface.

An automated handling system (gantry/robot, not included in delivery) is responsible for the motion in the various axes.

The gripper is connected to the handling system with integrated threaded bushes or with a special robot flange.

3.2 Product Name

The breakdown of the item designation (e.g. FQE-Xb-220-80-SBP220F-ABC00001C) is as follows:

Property	Variants
Type	FQE
Gripper type	M Xb Xc RM RXb RXc
Length–width	120 – 60 220 – 80 300 – 130
Sealing element type	**Suction cup:** Suction cup type + diameter + filter (if selected) SPB220F SAB220 **Sealing foam:** Foam designation + filter (if selected) O10 O10O10F
Individual configuration code	Unique 9-digit code (FQE-Xb-220-80-SBP220F-**ABC00001C**)

Product key for FQE-SP (SP stands for suction plate)

SP-FQE-300-130-SPB220F-ABC00001C

Product key for FQE-DI-PL (DI-PL stands for the German words for sealing plate)

DI-PL-FQE-300-130-O20-ABC00001C

3.3 Gripper Versions

The gripper FQE is available in three basic technical designs:

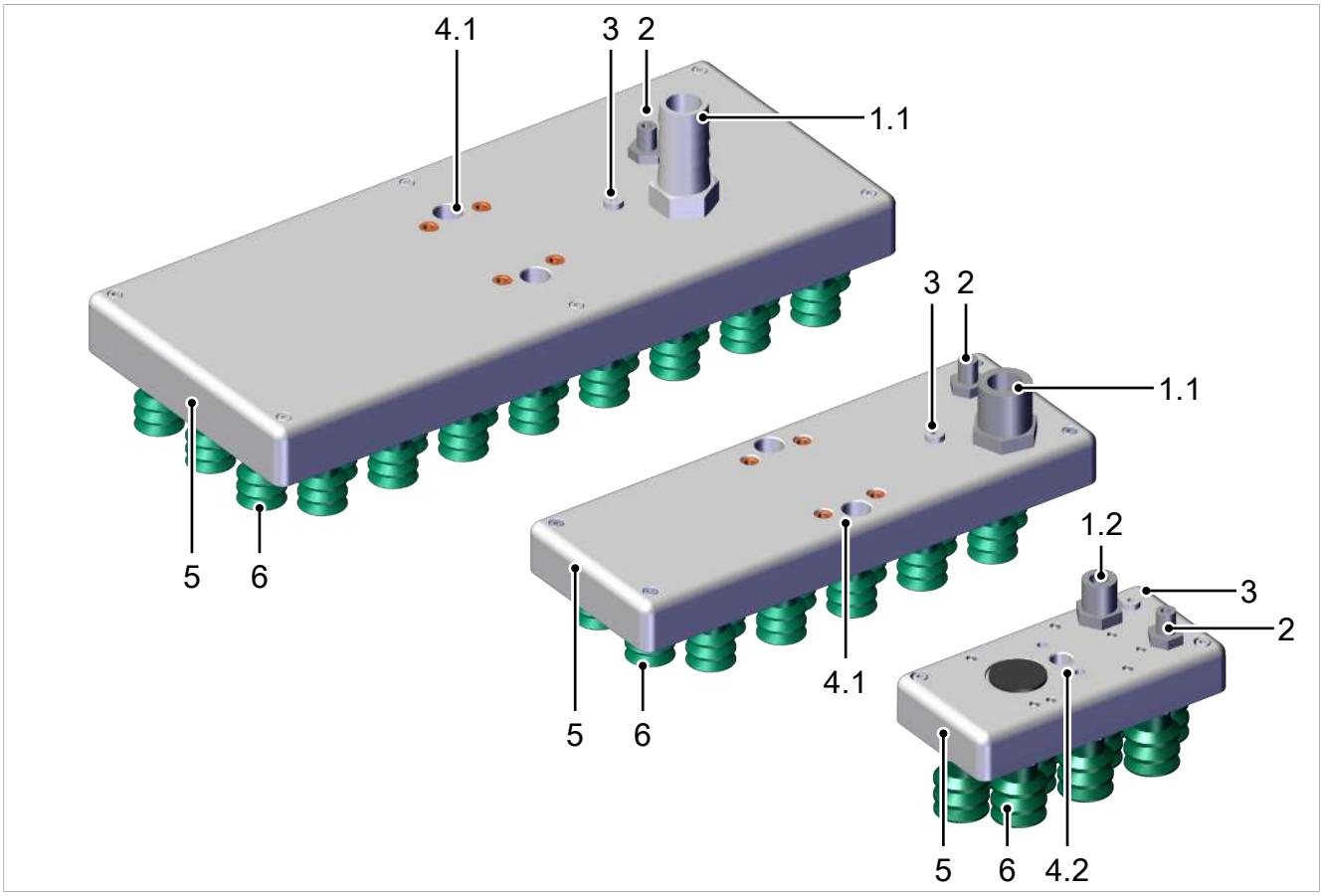
- Version FQE ... M, for external vacuum generation
- Version FQE ... Xb, with internal vacuum generation (ejector modules)
- Version FQE ... Xc, with internal vacuum generation (ejector modules) and control for "Pick up load" and "Release load"

For vacuum monitoring, a vacuum switch and/or a vacuum gauge can also be connected to connector (2) (> See ch. 9 Accessories, p. 55).

Each gripper is individual thanks to its customized design. Therefore, the grippers differ in detail in terms of the size of the suction area, the number of vacuum generators (ejector module), the arrangement and design of the suction cups or suction cells in the sealing plate, the flow restrictors, etc.

3.3.1 FQE-M

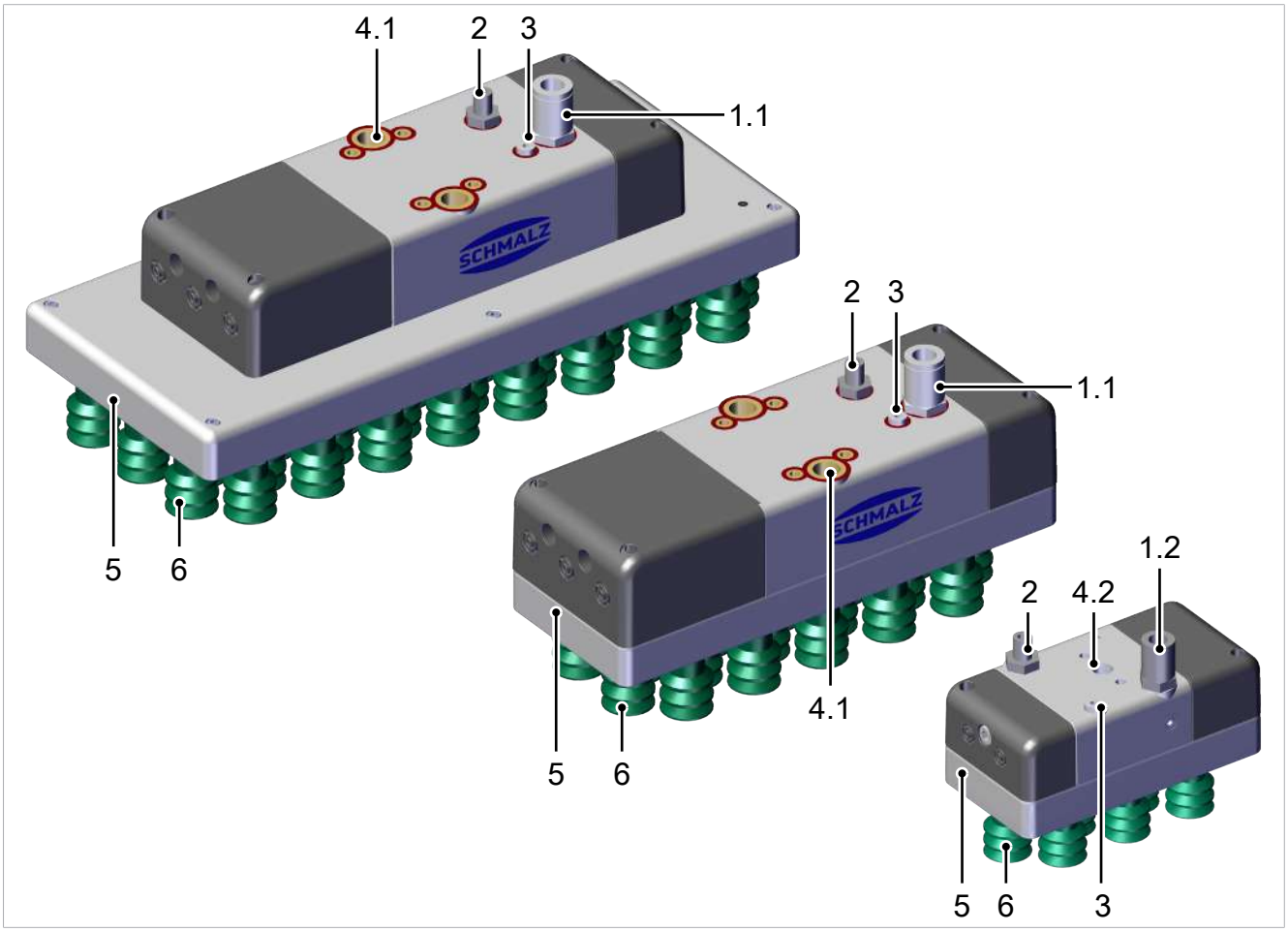
The gripper is supplied by an external vacuum. The connections for measuring the vacuum and for external blow-off are available for optional use.



1.1	1/2" vacuum connection	4.1	Mech. connection 2x 1/4" and 4x M5
1.2	1/4" vacuum connection	4.2	Mech. connection 1x 1/8" and 2x M5
2	1/8" vacuum measurement connection	5	Suction trough
3	M5 blow-off pulse connection	6	Suction plate, with suction cups or with sealing plate

3.3.2 FQE-Xb

Depending on the configuration, the gripper is equipped with 1 to 3 vacuum generators (ejector modules). The connections for measuring the vacuum and for an external blow-off pulse are available for optional use.

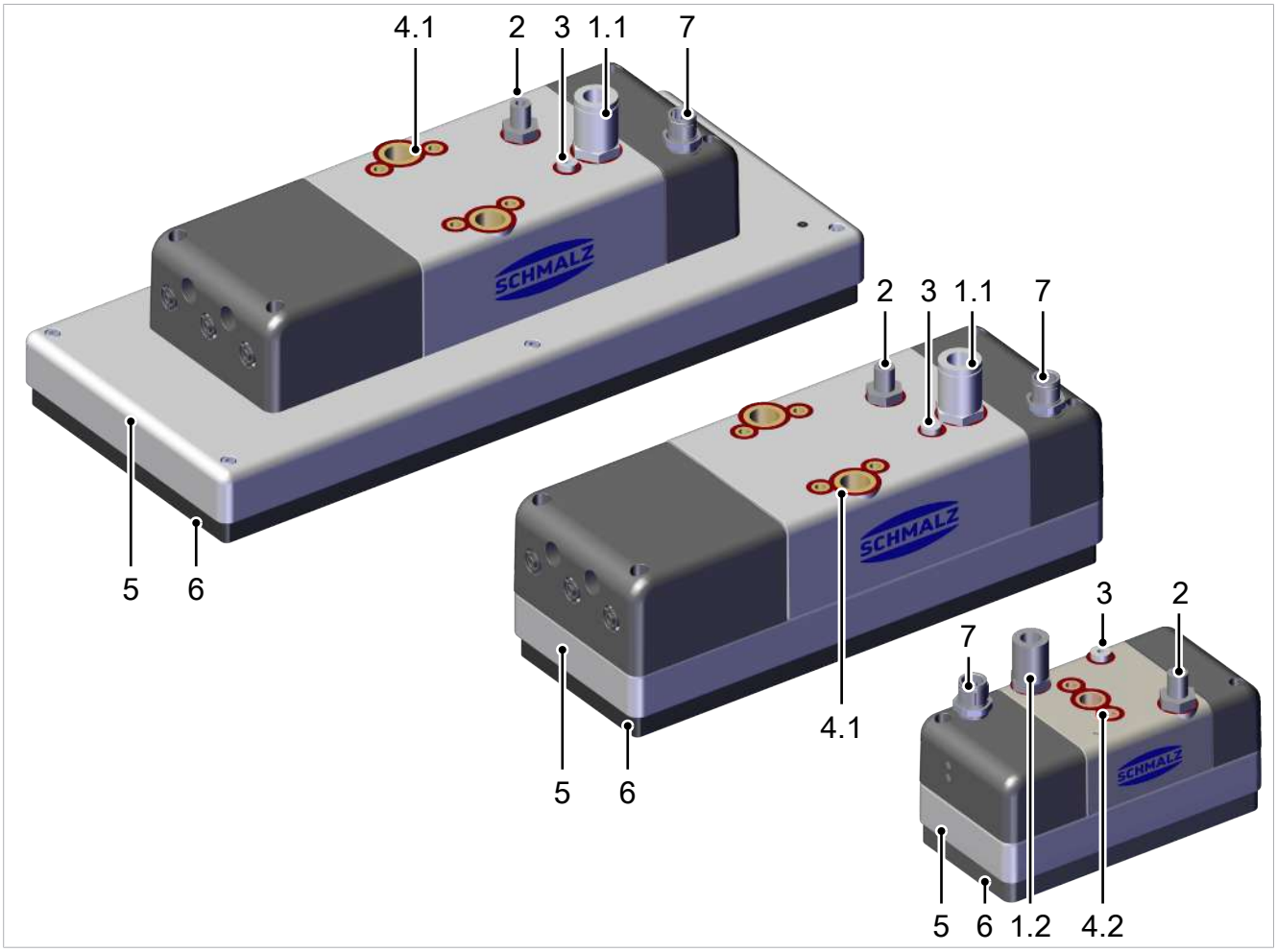


1.1	1/4" compressed air connection	4.1	Mech. connection 2x 1/4" and 4x M5
1.2	1/8" compressed air connection	4.2	Mech. connection 1x 1/8" and 2x M5
2	1/8" vacuum measurement connection	5	Suction trough
3	M5 blow-off pulse connection	6	Suction plate, with suction cups or with sealing plate

3.3.3 FQE Xc

Depending on the configuration, the gripper is equipped with 1 to 3 vacuum generators (ejector modules). The connections for measuring the vacuum and for an external blow-off pulse are available for optional use.

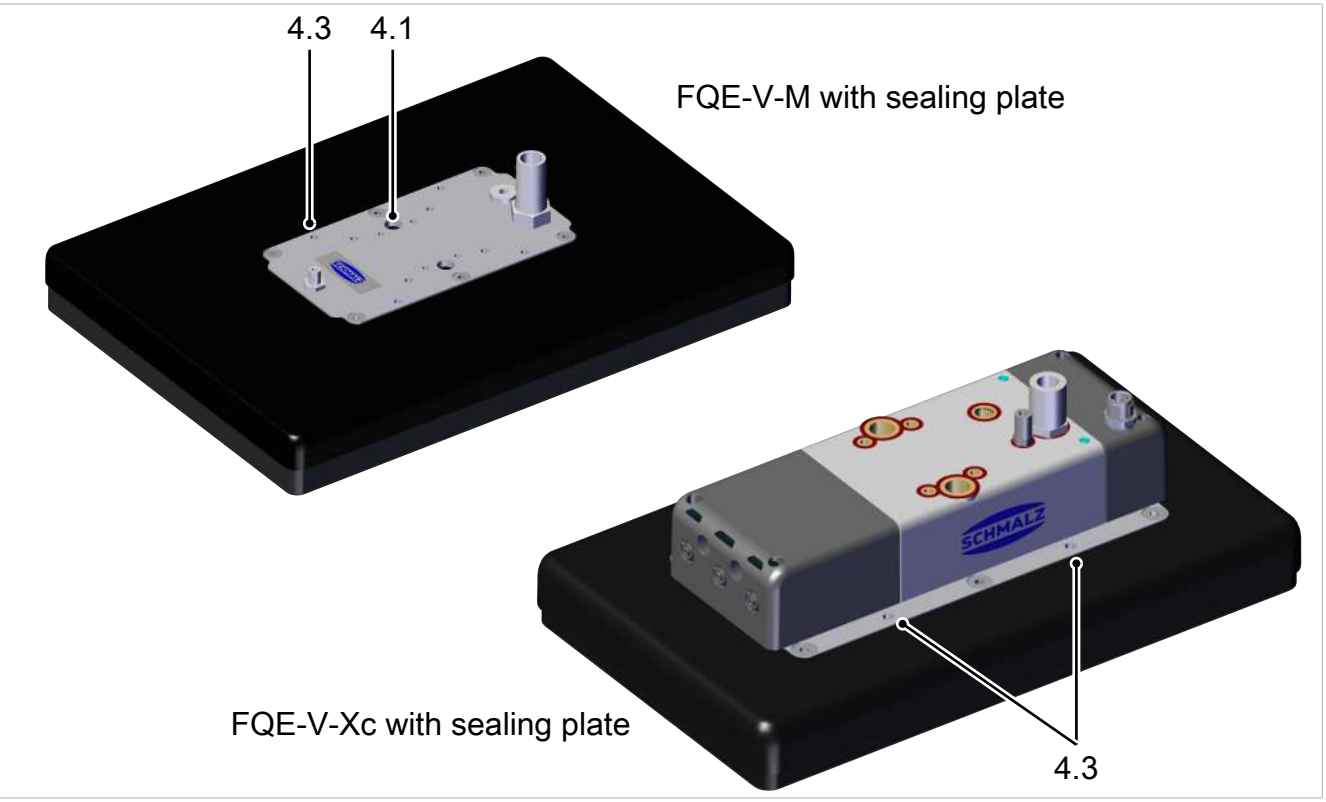
“Suction” and “blow-off” can be controlled via the integrated solenoid valves.



1.1	1/4" compressed air connection	4.1	Mech. connection 2x 1/4" and 4x M5
1.2	1/8" compressed air connection	4.2	Mech. connection 1x 1/8" and 2x M5
2	1/8" vacuum measurement connection	5	Suction trough
3	M5 blow-off pulse connection	6	Suction plate, with suction cups or with sealing plate
		7	M12-5 electrical connection

3.3.4 Version FQE-V ... Special Features

Version FQE-V can be supplied with custom suction area shapes within the minimum and maximum dimensions (rectangular, round, oval, free-form) depending on the load to be lifted. It is available in all three of the above versions, both with a sealing plate and with suction cups. (> See ch. 4.1 General Parameters, p. 20).



4.1	Mech. connection 2x 1/4" and 4x M5	4.3	Mech. connection FQE-V-M 8x M6 FQE-V-Xc 4x M6

4 Technical Data

4.1 General Parameters

Parameter	Gripper type		
	FQE ... M	FQE ... Xb	FQE ... Xc
Number of suction points	Based on the configuration – see order confirmation		
Operating pressure	3.0 to 6.0 bar		
Maximum degree of evacuation (at opt. input pressure)	90% of atmospheric pressure	• Size of gripper 120 x 60 mm: 670 mbar • Size of gripper >220 x 80 mm: 610 mbar	
Optimal input pressure	—	5.0 bar	
Compressed air consumption	—	45 to 250 l/min (depending on number and size of ejector modules)	
Compressed air quality	—	Dry, filtered air in acc. with ISO 8573-1:2010 [7:4:4]	
Max. suction rate	—	50 to 380 l/min (depending on number and size of ejector modules; see order confirmation)	
Permissible lift capacity (depending on size of gripper and load case; see also Schmalz.com/Vacuum expertise/Theoretical holding force of a suction cup)	**Load cases 1+2:** • FQE: – Size of gripper 120 x 60 mm: 70 N – Size of gripper 220 x 80 mm: 375 N – Size of gripper 300 x 130 mm: 375 N • FQE-V: – All gripper sizes 230 x 120 to 400 x 280 mm: 375 N **Load case 3:** • FQE: – Size of gripper 120 x 60 mm: 35 N – Size of gripper 220 x 80 mm: 185 N – Size of gripper 300 x 130 mm: 185 N • FQE-V: – All gripper sizes 230 x 120 to 400 x 280 mm: 185 N		
Sound level at full coverage	—	• Size of gripper 120 x 60 mm: 64.1 dB(A) • Size of gripper 220 x 80 mm: 62.7 dB(A) • Size of gripper 300 x 130 mm: 64.6 dB(A)	
Operating voltage	DC 24 V		
Ambient temperature / load surface temperature	Sealing plate: 5 to +60° C Suction cup: -20 to +60° C	5 to +50° C	
Maximum relative humidity, non-condensing	90%		
Foam/suction cup grid	Based on the configuration – see order confirmation		
Weight	Based on the configuration – see type plate		

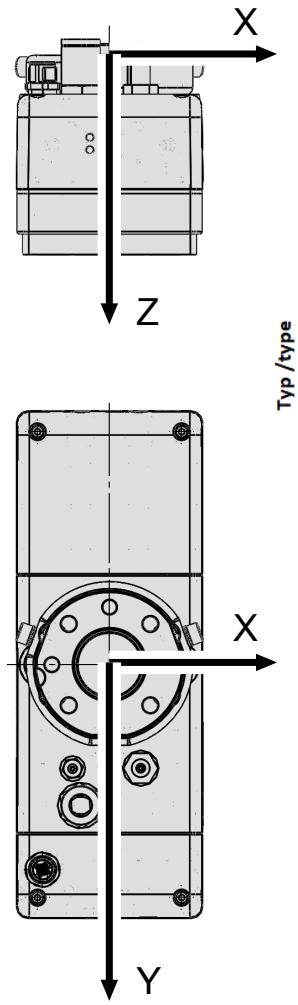
Requirements for achieving the maximum lift capacity:

- There is a friction factor of μ=0.5 between the suction plate and the load.
  - The contact surfaces between the suction cup and load must be free from humidity, moisture, dirt, dust, oil or other substances that may reduce friction levels.
- The area gripper is completely covered by the load.

*) The actual maximum lift capacity depends on a number of parameters including:

- The vacuum applied
- Gripper contact pressure
- Evacuation time
- Air permeability of the load
- Surface quality of the load
- Weight of the load
- Handling speed
- Acceleration

Tool center point = Tool Center Point (TCP) and center of gravity = Center of Gravity (COG)

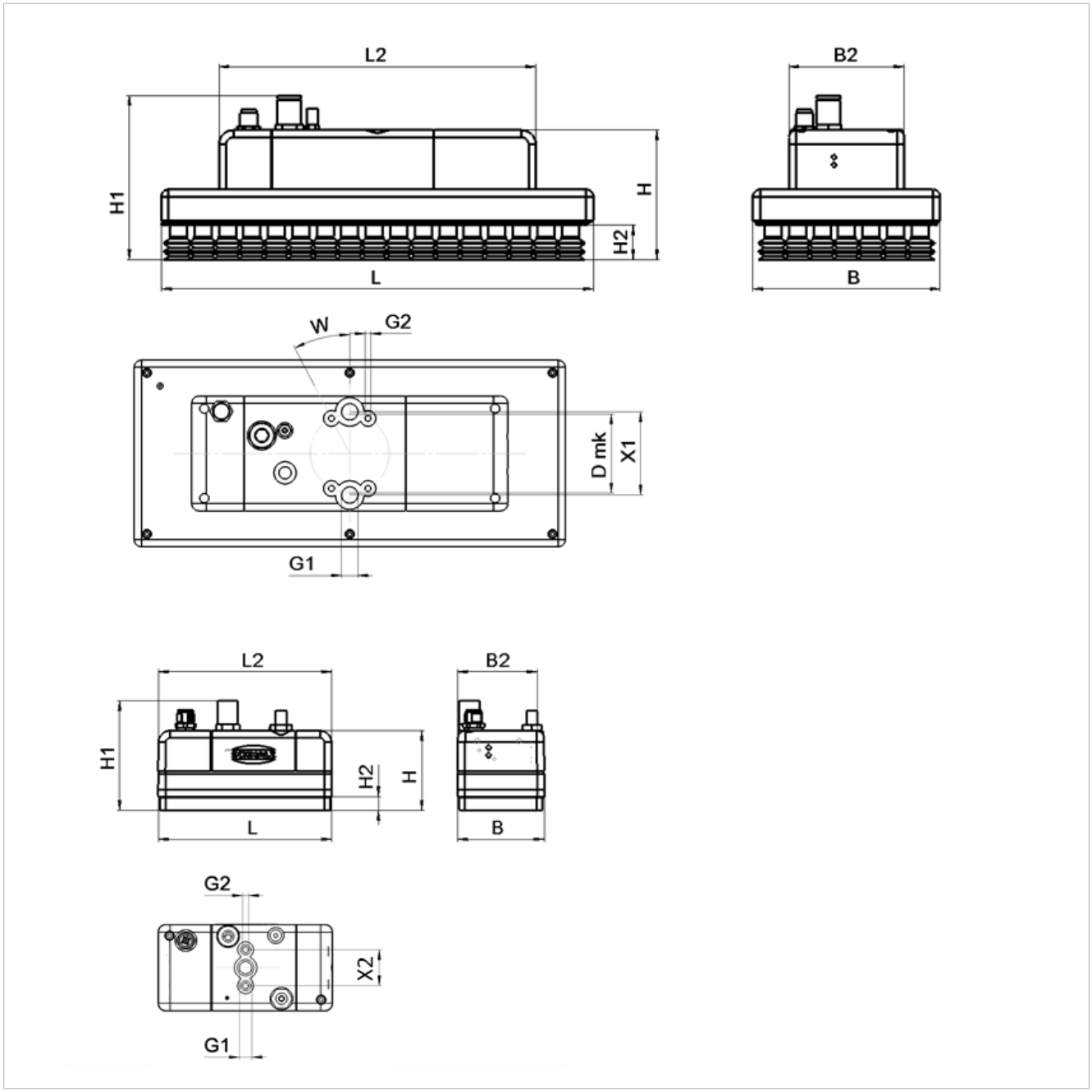


Greifergröße / Gripper dimensions [mm]

Typ /type		120x60		220x80		300x130	
Schaum / foam	TCP [mm]	X	0	X	0	X	0
		Y	0	Y	0	Y	0
		Z	80	Z	80	Z	85
	COG [mm]	X	0	X	0	X	0
		Y	0	Y	15	Y	10
		Z	40	Z	40	Z	50
	Gewicht/ weight [Kg]		0,63	Gewicht/ weight [Kg]	0,95	Gewicht/ weight [Kg]	1,35
Push-In Sauger / push-in suction cups	TCP [mm]	X	0	X	0	X	0
		Y	0	Y	0	Y	0
		Z	100	Z	95	Z	100
	COG [mm]	X	0	X	0	X	0
		Y	0	Y	10	Y	10
		Z	40	Z	45	Z	55
	Gewicht/ weight [Kg]		0,65	Gewicht/ weight [Kg]	1,01	Gewicht/ weight [Kg]	1,52
Einschraubsauger / screw in suction cups	TCP [mm]	X	0	X	0	X	0
		Y	0	Y	0	Y	0
		Z	105	Z	100	Z	105
	COG [mm]	X	0	X	0	X	0
		Y	0	Y	10	Y	10
		Z	45	Z	50	Z	60
	Gewicht/ weight [Kg]		0,7	Gewicht/ weight [Kg]	1,2	Gewicht/ weight [Kg]	1,92

The above specifications apply to a gripper FQE-Xc with flange for UR.

4.2 Dimensions



	L	L2	B	B2	H	H1*	H2	G1	G2	Dmk	W	X1	X2
FQE 120x60, Sealing plate	120	120.1	60	60	55	75.7	10	1/8	M5	--	--	--	25
FQE 120x60, Screw-in suction cup	120	120.1	60	60	76.3	97	31.3	1/8	M5	--	--	--	25
FQE 120x60, Plug-in suction cup	120	120.1	60	60	69.3	90	24.3	1/8	M5	--	--	--	25
FQE 220x80, Sealing plate	220	220.5	80	80.5	70	94	10	1/4	M5	55	27.5°	58	--

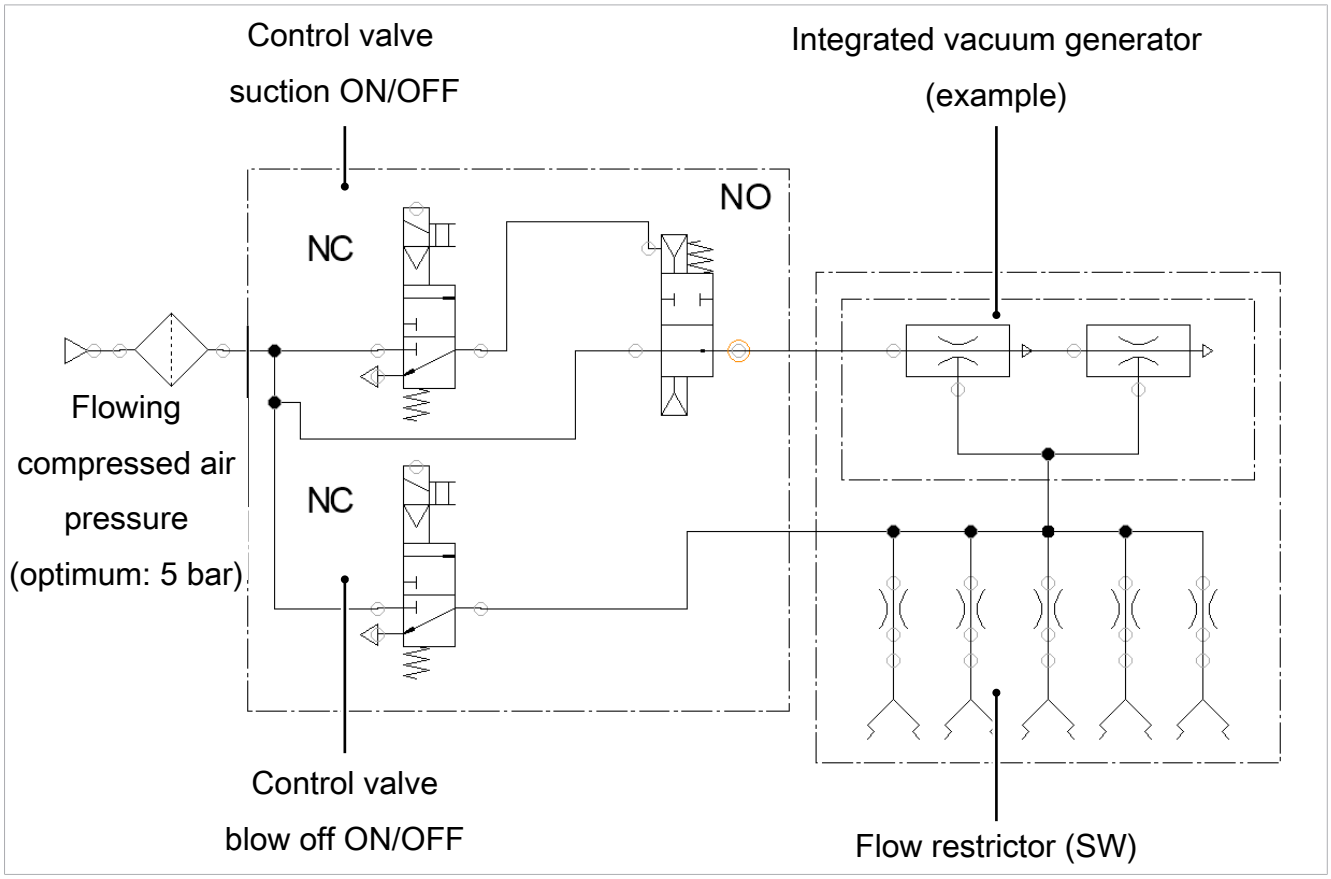
FQE 220x80, Screw-in suction cup	220	220.5	80	80.5	91.3	115.3	31.3	1/4	M5	55	27.5°	58	--
FQE 220x80, Plug-in suction cup	220	220.5	80	80.5	84.3	108.3	24.3	1/4	M5	55	27.5°	58	--
FQE 300x130, Sealing plate	300	220.5	130	80.5	70	94	10	1/4	M5	55	27.5°	58	--
FQE 300x130, Screw-in suction cup	300	220.5	130	80.5	91.3	115.3	31.3	1/4	M5	55	27.5°	58	--
FQE 300x130, Plug-in suction cup	300	220.5	130	80.5	84.3	108.3	24.3	1/4	M5	55	27.5°	58	--

* H1 is provided as an example and varies based on the configuration

4.3 Version Xc control

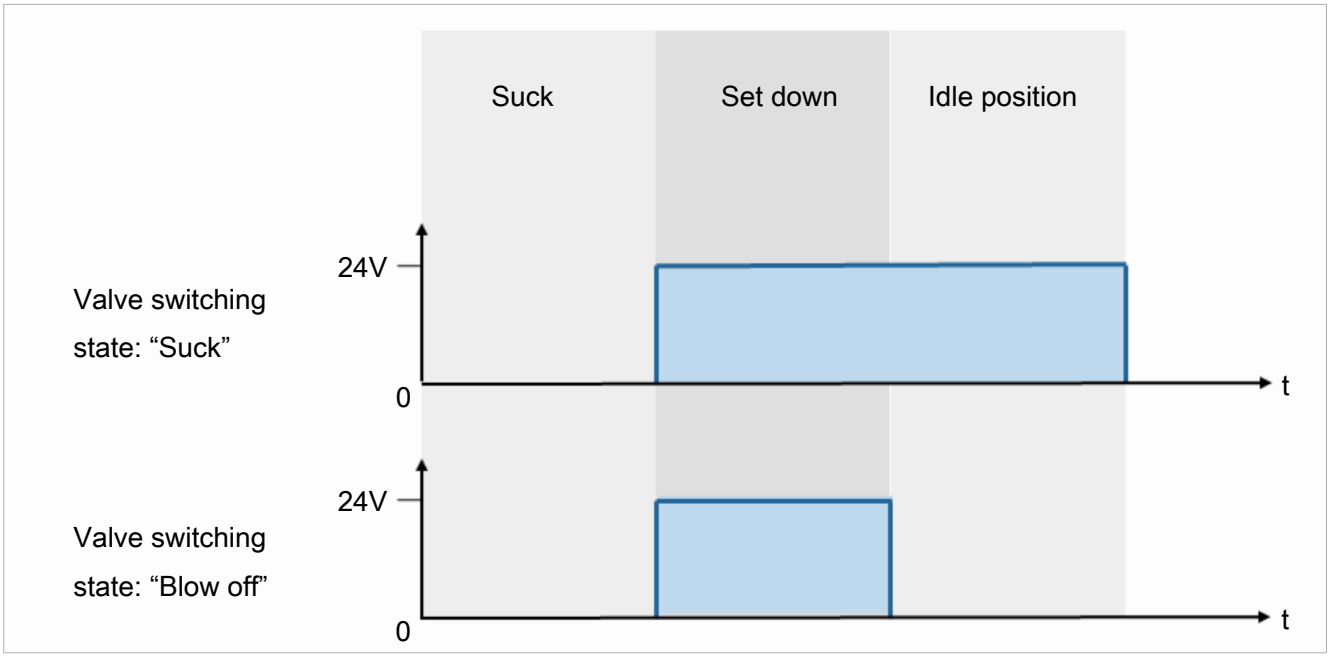
4.3.1 Pneumatic Circuit Diagram

FQE ... Xc



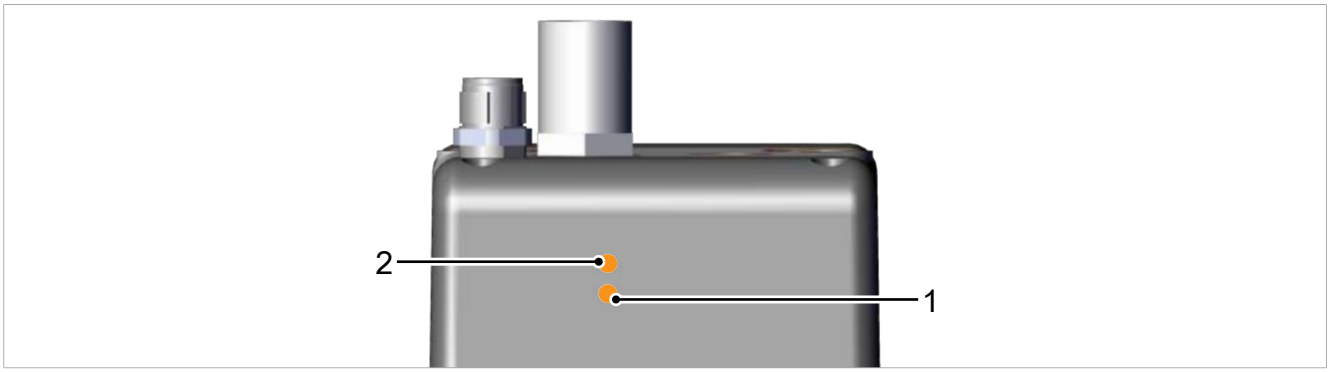
4.3.2 Solenoid Valve Circuit Diagram

FQE ... Xc



4.3.3 Display Elements

In the version Xc, one LED is assigned to each of the process states "suction" and "blow-off".



Item	Meaning	Status	Description
1	Suction LED	Lights up	“Suction” OFF
		OFF	"Suction" ON (transport load)
2	Blow-off LED	Lights up	"Blow-off" ON (release load)
		OFF	“Blow-off” OFF

5 Transportation and Storage

5.1 Checking the Delivery

The scope of delivery can be found in the order confirmation. The weights and dimensions are listed in the delivery notes.

1. Compare the entire delivery with the supplied delivery notes to make sure nothing is missing.
2. Damage caused by defective packaging or occurring in transit must be reported immediately to the carrier and J. Schmalz GmbH.

5.2 Reusing the Packaging

The product is delivered in cardboard packaging. The packaging should be reused to safely transport the product at a later stage.

Keep the packaging for future transport or storage.

6 Installation and Start of Operations

6.1 Safety Instructions for Installation

- The product must be installed and maintained only by qualified electrical, pneumatic and mechanical specialists.

⚠ WARNING

Electric shock due to improper electrical connection

Risk of injury!

- Operate the product using a power supply unit with protected extra-low voltage (PELV).

⚠ WARNING

Applications with collaborative robots:

Insufficient vacuum generation or insufficient coverage of the gripper.

The load drops immediately.

Risk of injury from falling load!

- The operator must be separated from the handling area of the load by a secure barrier.

⚠ CAUTION

Risk of injury due to strong vacuum!

- Prior to installation and before maintenance work, the higher-level machine must be disconnected from the power supply, depressurized (vented to the atmosphere) and secured against unauthorized restart.

⚠ CAUTION

Noise pollution due to incorrect installation of the pressure and vacuum connections

Hearing damage!

- Correct installation.
- Wear ear protection.

⚠ CAUTION

Noise pollution caused by exhaust air or leakage during operation

Hearing damage!

- In the event of leakage, check connections and lines and remedy leakages.
- Wear ear protection.

⚠ CAUTION

Compressed air or vacuum in direct contact with the eye

Severe eye injury!

- Wear eye protection
- Do not look into compressed air openings.
- Do not look into the exhaust air outlets on the ejector.
- Do not look into vacuum openings such as suction cups, suction lines and hoses.

⚠ CAUTION

Risk of crushing if the suction cup is abruptly attached to the load!

- Do not place any body parts between the gripper and load.

6.2 Responsibility of the Integrator

The system integrator must carry out a risk assessment of the entire system for all operating modes and define the danger zone precisely. In doing so, country-specific provisions and regulations must be observed.

- Ensure that the gripper cannot be started up by unauthorized persons.
- Ensure that collisions with the surrounding environment and objects are avoided to prevent the load from breaking off.
- Before handling unfamiliar loads, carry out tests to ensure safe operation.
  - The load to be lifted is sufficiently rigid so that it cannot be damaged during gripping and handling.

6.2.1 Automatic Operation

⚠ CAUTION

When the system is started in automatic operation, components move without advanced warning.

Risk of injury!

- Ensure that the danger zone of the machine or system is free of persons during automatic operation (for example, protective barriers or sensor systems).

The following measures must be taken each time automatic operation is activated:

1. Check the product for visible damage. Correct any faults or report them to the supervising personnel immediately.
2. Ensure that the safety features preventing access to the danger zone (protective fence, sensors, etc.) are functioning correctly.
3. Ensure that the travel path of the gripper is free of obstacles.

6.2.2 Operating Modes with Specific Risks

Cleaning and refitting operations requiring access to the danger zone must only be carried out by specially trained personnel.

⚠ CAUTION

Risk of injury by working in the secured area

When working in the secured area is unavoidable (for example, during start of operations, teaching or troubleshooting), the following measures must be taken:

- Ensure that no unauthorized persons are present in the danger zone.
- Put down any raised loads.
- Actuate the EMERGENCY STOP switch and ensure the gripper cannot be inadvertently switched on.
- Maintain a safe distance.

⚠ CAUTION

Operation with a collaborative robot

Risk of injury due to sharp edges on load

- Wear suitable work gloves.
- Maintain a safe distance.

6.3 Installation Instructions

⚠ CAUTION

Improper installation or maintenance

Personal injury or damage to property

- Prior to installation and before maintenance work, the product must be disconnected from the power supply, depressurized (vented to the atmosphere) and secured against unauthorized restart.

⚠ CAUTION

Vacuum generator failure

Risk of injury from falling load!

- If the supplied gripping system does not contain an electronic vacuum monitor, the vacuum must be monitored by the integrator.

NOTE

Incorrect power supply

Destruction of the integrated electronics

- Operate the product using a power supply unit with protected extra-low voltage (PELV).
- The system must incorporate safe electrical cut-off of the power supply in compliance with EN60204.
- Do not connect or disconnect the connector under tension and/or when voltage is applied.

The gripper can be mechanically connected as follows:

- (> See ch. 6.4.2 Mounting with the Threaded Bushes on the Gripper, p. 30)
  (> See ch. Dimensions)
- (> See ch. 6.4.4 Mounting with Robot-Specific Flange Plate (ROB-SET), p. 33)
- (> See ch. 6.4.3 Mounting Using Accessories, p. 32)

For safe installation, the following instructions must be observed:

- Ensure that the higher-level machine is disconnected from the power supply.
- The gripper may be installed in any position.

- Approved mechanical connection:
  - Threaded bushes (> See ch. 6.4.1 Maximum Torque, p. 30)
  - Robot-specific connection sets (ROB-SET)
- Use machine screws with wedge lock washers for mechanical connection.
- For safe access to the gripping system during troubleshooting or maintenance work, ensure a distance of approximately 1,0 m from fixed devices around the circumference of the gripper.
- Compressed air connection (> See ch. 6.6 Pneumatic connection, p. 35).
- Observe the required compressed air quality (see the "Technical Data" section).
- Electrical connection:
  - **Version Xc:** For the PIN assignment for the electrical connection of the bushing (3) (> See ch. 6.5 Electrical Connection, p. 34).
  - For the PIN assignment for the electrical connection of the vacuum switch , see the operating instructions in the appendix.
- Tighten all bolts to the specified torque values in accordance with the applicable standard and secure them against becoming loose.

For the control and parameterization of the vacuum switch or the ejector module, see the respective operating instructions in the appendix, if required.

6.4 Mechanical Attachment

6.4.1 Maximum Torque

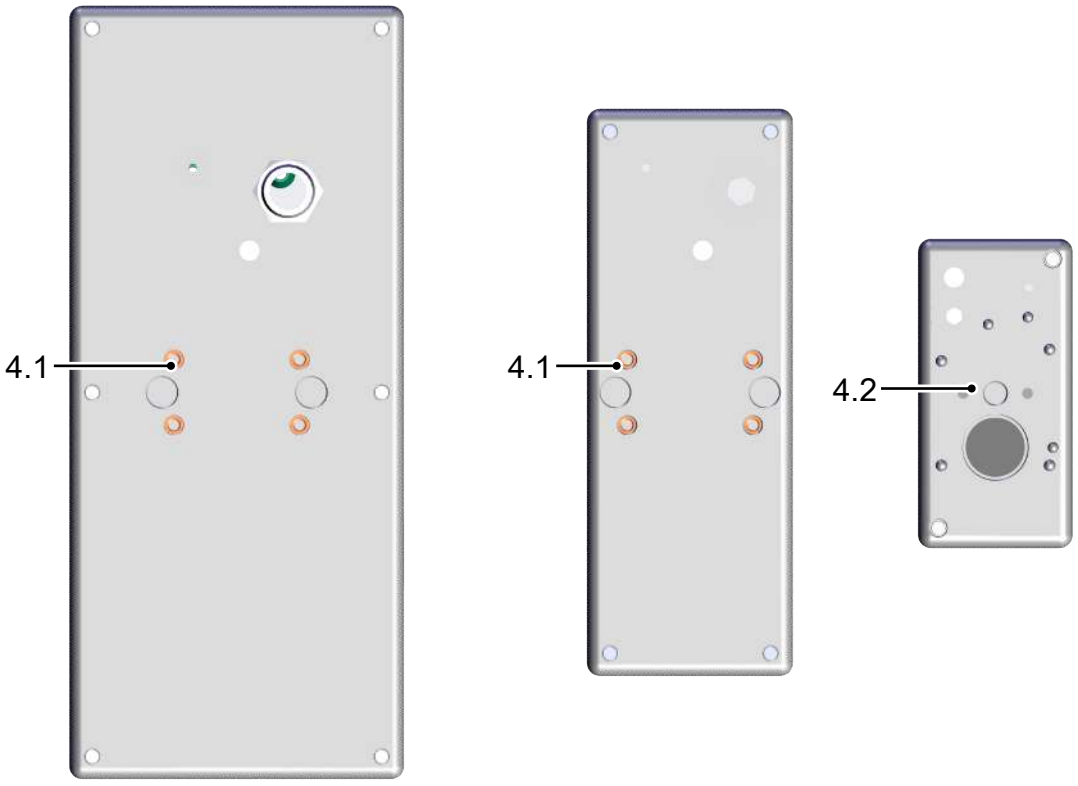
Unless otherwise specified, the following tightening torques apply for the installation.

Connector	Max. tightening torque
1/8" threaded bush	6.5 Nm
1/4" threaded bush	6.5 Nm
M5 threaded bush	6.5 Nm
M6 threaded bush	11.0 Nm

6.4.2 Mounting with the Threaded Bushes on the Gripper

Drilling template for threaded bushes (> See ch. 4.2 Dimensions, p. 22).

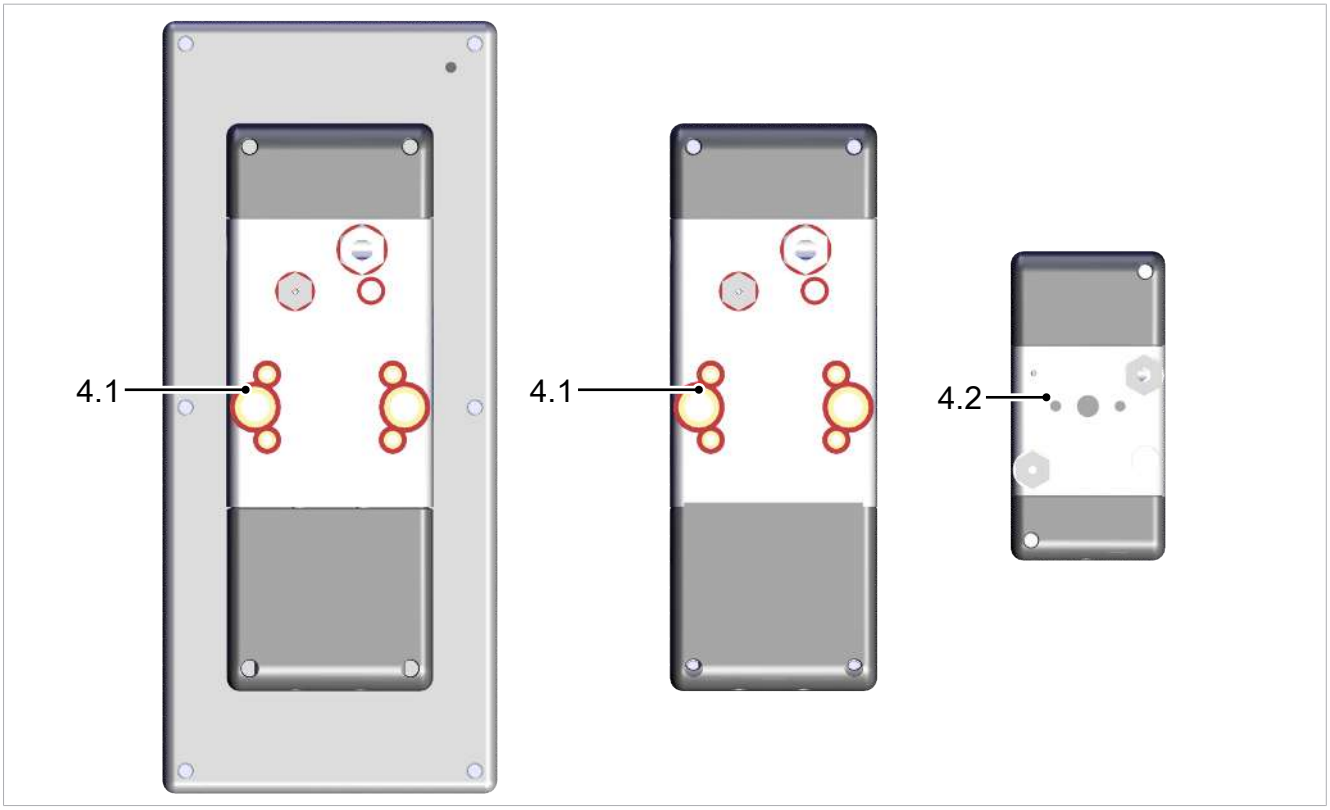
FQE-M



4.1	Gripper sizes >220 x 80 mm: 2x 1/4" and 4x M5	4.2	Size of gripper 120 x 60 mm: 1x 1/8" and 2x M5

IMPORTANT! The gripper must always be attached to handling systems where **all** threaded bushes are of the same type.

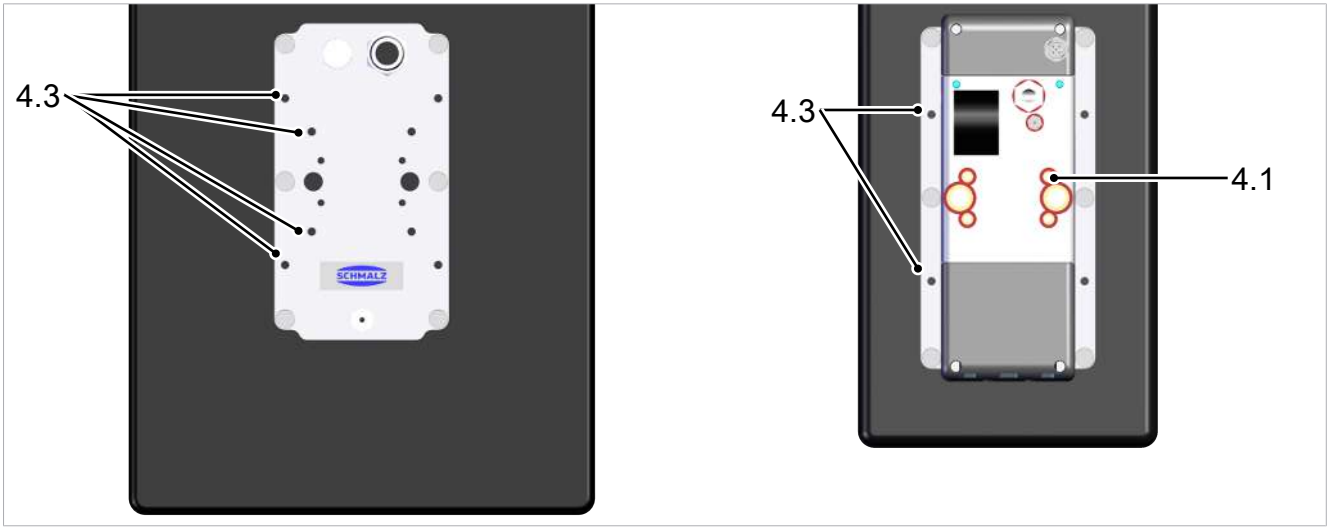
FQE-X



4.1 Gripper sizes >220 x 80 mm: 2x 1/4" and 4x M5	4.2 Size of gripper 120 x 60 mm: 1x 1/8" and 2x M5

IMPORTANT! The gripper must always be attached to handling systems where **all** threaded bushes are of the same type.

FQE-V



4.3 M6 female thread FQE-V-M 8x M6	4.1 Gripper sizes >220 x 80 mm: 2x 1/4" and 4x M5 4.3 M6 female thread FQE-V-Xc 4x M6
IMPORTANT! The gripper must always be fastened to handling systems with **four symmetrically arranged** threaded bushes.	**IMPORTANT!** The gripper must always be attached to handling systems where **all** threaded bushes are of the same type.

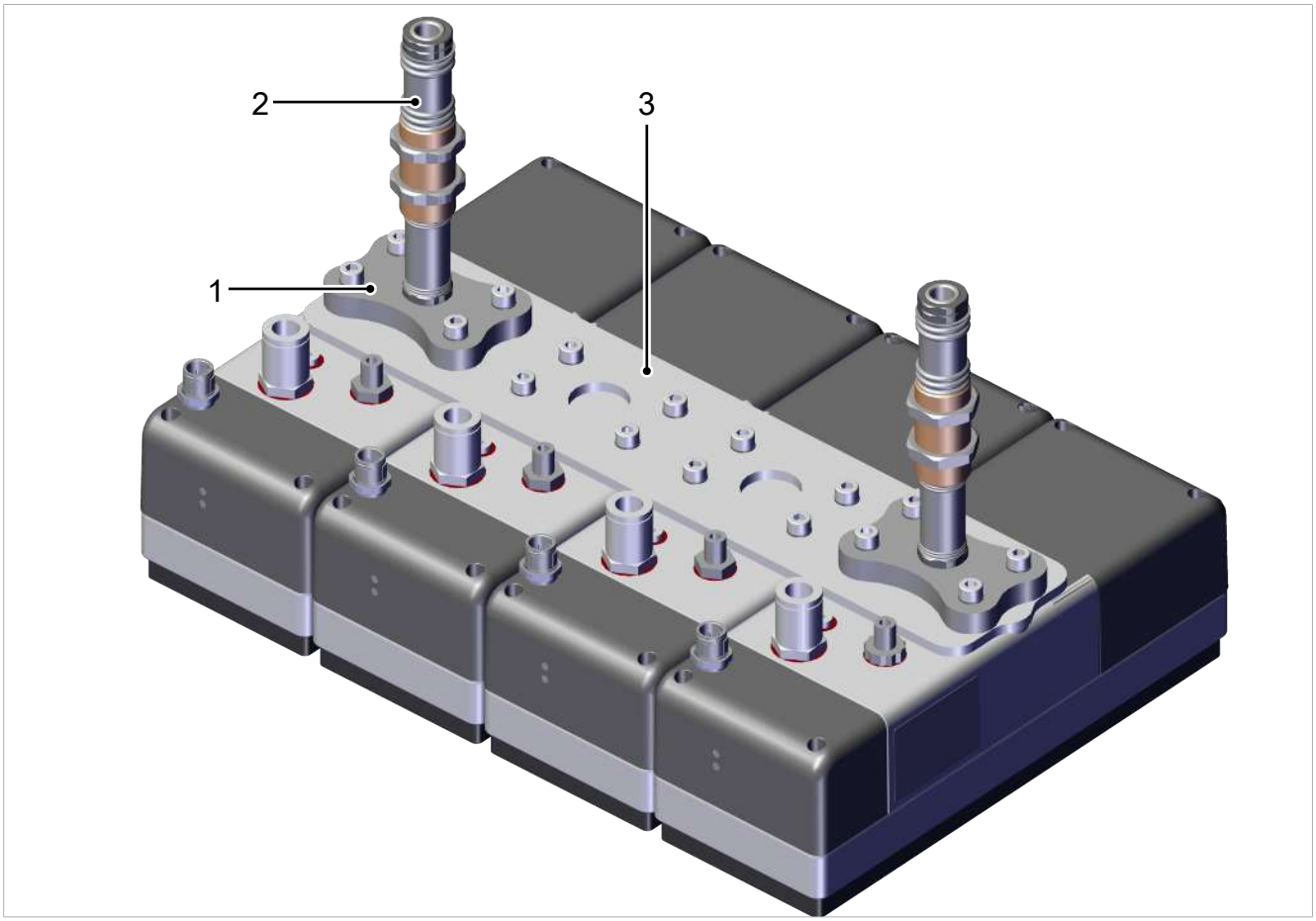
6.4.3 Mounting Using Accessories

The components for this type of connection are available as accessories for the respective size of gripper (> See ch. 9 Accessories, p. 55).

The gripper models FQE-V cannot be block mounted.

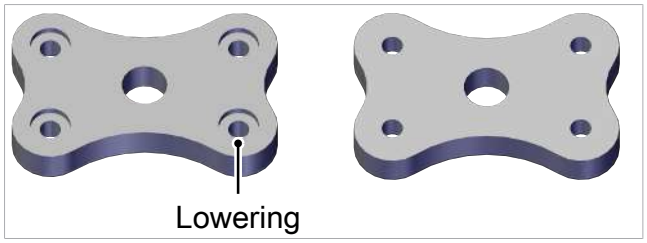
- Connecting plates (3) can be used to mechanically connect two to four grippers.
- Depending on the version, the connecting plates have a connection thread of 1/8", 1/4" and 1/2" that allows them to be adapted to the Schmalz spring plunger.
- The connecting plates and the adapter plates (1) are supplied with the bolts required for mounting.
- The customer is responsible for choosing the right size connection (application, transported load).

The spring plungers (2) must be fastened as far out as possible on the outside of the block-mounted grippers.
An example for mounting 220 x 80 mm grippers on blocks is provided below.



1	Adapter plate (220 x 80 and 300 x 130 mm gripper sizes only)	3	Connecting plate
2	Spring plunger		

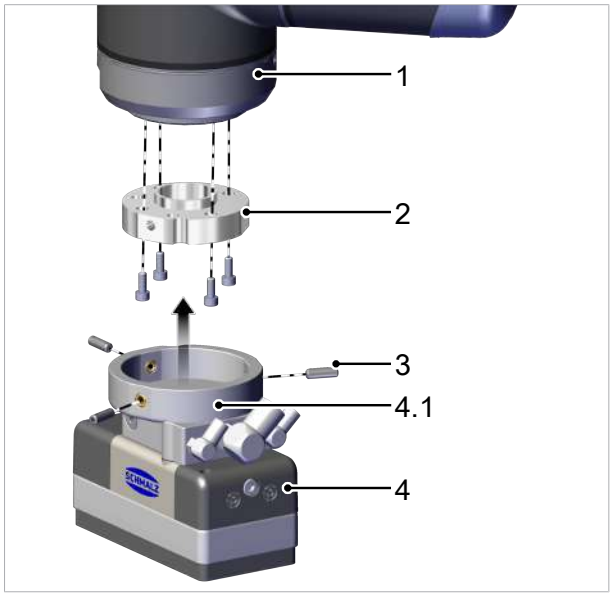
Notes on the adapter plate (1):



- The adapter plate is used only in combination with the 220 x 80 and 300 x 130 mm gripper sizes.
- The boreholes on the adapter plate are sunken on one side.
  - Size of gripper 220 x 80 mm:
    Attach the adapter plates to the connecting plate such that the sunken side is pointing downwards (towards the gripper; otherwise, the supplied screw is too long).
  - Size of gripper 300 x 130 mm:
    Attach the adapter plates to the locking plate such that the sunken side is pointing upwards (away from the gripper; otherwise, the supplied screw is too short).

6.4.4 Mounting with Robot-Specific Flange Plate (ROB-SET)

The robot is selected while configuring the gripper FQE. The flange module is mounted on the gripper at the factory. The flange plate is supplied loose and is mounted on the robot by the customer.
The design of the flange module varies depending on the size of the gripper. The following figure shows the gripper size 120 x 60 mm.



1. Mount the flange plate (2) on the robot (1).
2. Push the gripper (4) with the factory-fitted flange module (4.1) onto the flange plate (2).
3. Secure the gripper to the flange plate with M5x16 set screws (3). The set screws must not protrude.
4. Tighten the set screws with a torque of 2.5 Nm.

6.5 Electrical Connection

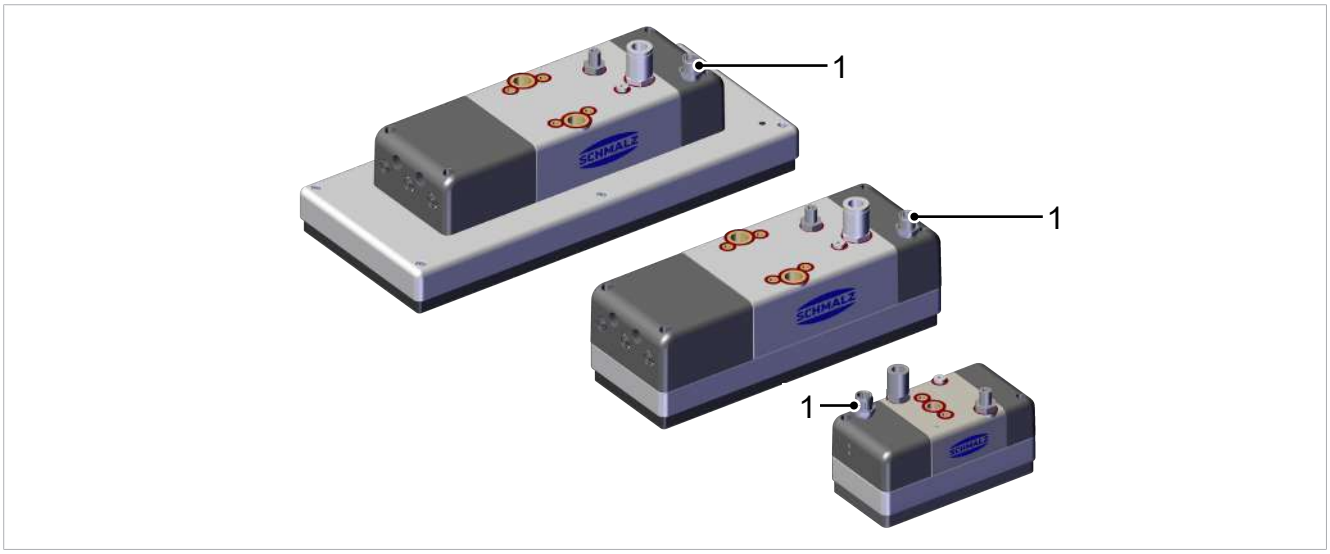
⚠ WARNING

Electric shock due to improper electrical connection

Risk of injury!

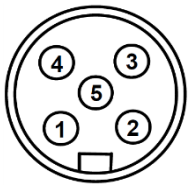
- Operate the product using a power supply unit with protected extra-low voltage (PELV).

Versions M and Xb are not electrically connected.
Version Xc has integrated solenoid valves, which are controlled via an M12-5 connector.

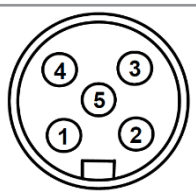


1	M12-5 electrical connection (socket)

Version PNP:

M12 connector	Pin	Litz wire color	Function
	1	Brown	Not used
	2	White	Blow-off valve “On”
	3	Blue	Ground
	4	Black	Suction valve “Off”
	5	Gray	Not used

Version NPN:

M12 connector	Pin	Litz wire color	Function
	1	Brown	24 V
	2	White	Blow-off valve “On”
	3	Blue	Not used
	4	Black	Suction valve “Off”
	5	Gray	Not used

6.6 Pneumatic connection

- Where possible, use pipelines instead of hoses.
- Shorten the hoses and pipelines as much as possible to keep the response times as short as possible.
- Keep the hose lines free of bends and crimps
- Observe the minimum bend radius of the hoses.
- Route hoses so that they do not rub against or collide with other components.
  Observe the travel paths of the gripper!
- To minimize pipeline/hose damage, the bending radii should be as large as possible (> 90°).
- The hoses must be of sufficient size.

⚠ CAUTION

Compressed air or vacuum in direct contact with the eye

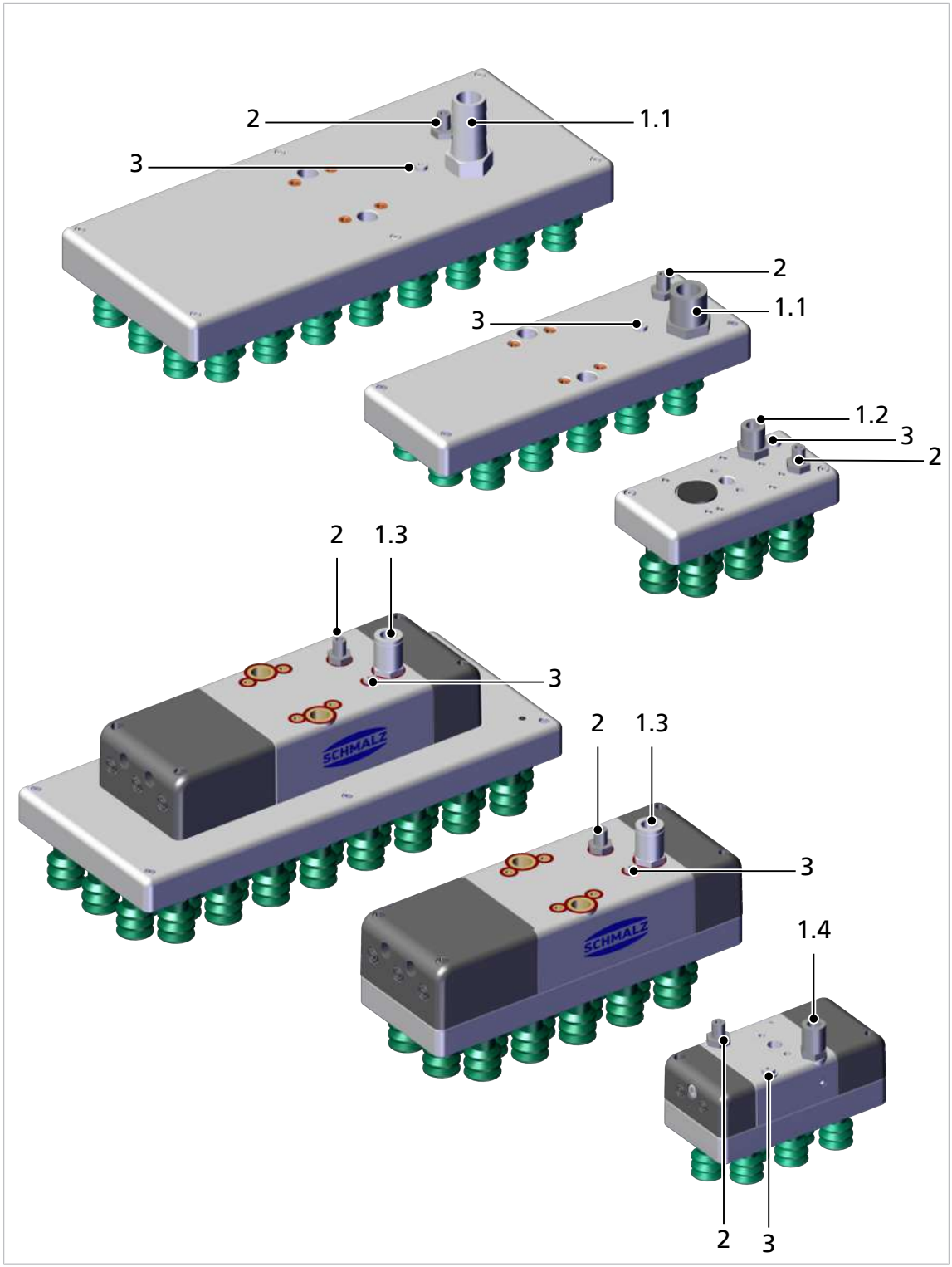
Severe eye injury

- Wear eye protection
- Do not look into compressed air openings
- Do not look into the silencer air stream
- Do not look into vacuum openings such as suction cups, suction lines and hoses.

Version M is externally supplied with vacuum, while vacuum generators (ejector modules) are integrated into version X.

For vacuum monitoring, a vacuum switch and/or a vacuum gauge can also be connected to connector (2) (> See ch. 9 Accessories, p. 55).

To ensure that the workpiece is deposited quickly, an external blow-off pulse can be provided via the connection (3). With version Xc, a blow-off pulse can be provided via the control.

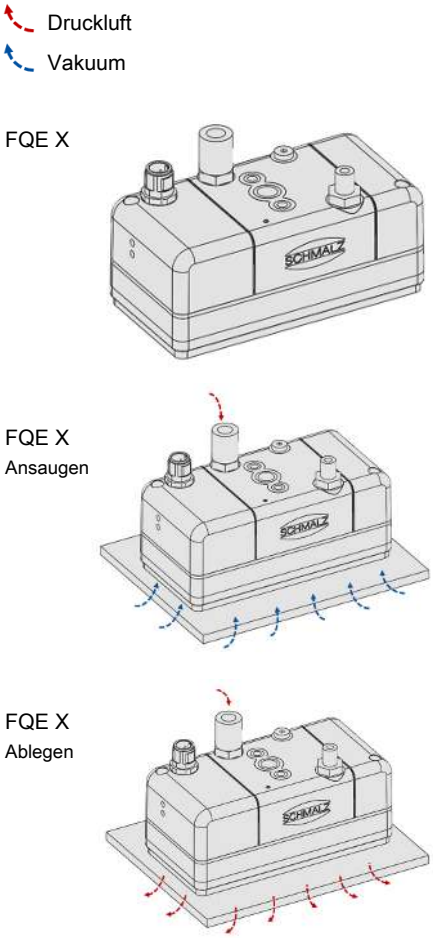


1.1	1/2" vacuum connection	1.2	1/4" vacuum connection
1.3	1/4" compressed air connection	1.4	1/8" compressed air connection
2	1/8" vacuum measurement connection	3	M5" blow-off pulse connection

See also

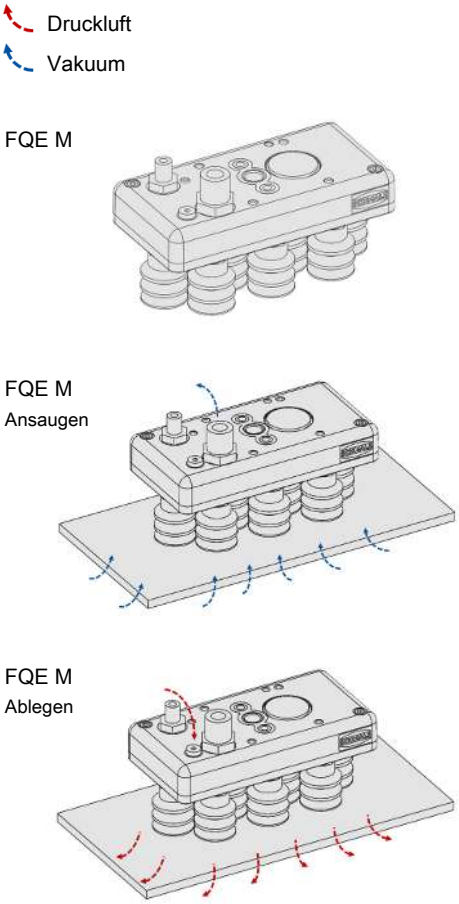
Accessories [▶ 55]

6.7 Transport Cycle



Procedure for versions FQE ... X

Version Xc: Shut down compressed air via solenoid valve
Version Xb: Switch off compressed air externally



Procedure for versions FQE ... M

Use an external blow-off pulse to deposit work-pieces more quickly.

1. Move the gripper to the start position.
2. Lower the gripper vertically until it is pressed onto the load.
   - ⇨ **Sealing plate**: As soon as the sealing plate is compressed by 50%, suction can be applied to the load by switching on the vacuum supply.
   - ⇨ **Suction cup**: As soon as the suction cups are compressed by half the specified maximum stroke, suction can be applied to the load by switching on the vacuum supply.
3. Applying suction to the load:
   - ⇨ **Version M**: Apply vacuum to the vacuum connection.
   - ⇨ **Version Xb**: Apply compressed air to the compressed air connection.
   - ⇨ **Version Xc**: Compressed air must be applied to the compressed air connection. The corresponding solenoid valve must also be activated (> See ch. Pneumatic circuit diagram)
   - ⇨ The vacuum can be activated at the connection (2) using a vacuum switch (option).
4. As soon as the load is safely picked up and the working vacuum is established, the gripper can be moved.
5. Carefully lift the picked up load.

6. Move the load to the desired release position.
7. Before releasing the load, ensure that it has been set down securely and cannot slip or tilt.
8. Switch off the vacuum to release the load.
   ⇨ **Version M**: Shut down the vacuum at the vacuum connection.
   ⇨ **Version Xb**: Shut down compressed air at the compressed air connection.
   ⇨ **Version Xc**: Activate the corresponding solenoid valve (> See ch. Pneumatic circuit diagram)
   ⇨ The suction plate is automatically ventilated.
9. If required, remove the load from the compressed air connection with a blow-off pulse.
10. Raise the gripper without a load.

⇨ The gripping system can be returned to the start position.

6.8 Before Initial Start of Operations

For the control and parameterization of the vacuum switch or the ejector module, see the respective operating instructions in the appendix, if required.

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

- Check the condition and function of the safety features.
- The safety distances have been maintained.
- All mechanical connectors are properly attached and secured.
- All bolts and nuts are tightened to specified torques according to the valid standard and secured against becoming loose.
- All components are installed.
- The electrical cable and supply hoses are properly routed.
- The vacuum switch is functioning correctly.
- The EMERGENCY STOP switch on the higher-level machine is functioning.
- Check the function of the gripper.
- The type plate is clearly legible.

7 Troubleshooting

7.1 Safety Instructions for Troubleshooting

Faults must be repaired only by qualified mechanical, pneumatics and electrical specialists.

Personnel must have read and understood the instructions.

⚠ WARNING

Unexpected movement of the handling system during troubleshooting

Serious injury or death!

- Before performing any troubleshooting, ensure that the handling system cannot start unexpectedly.

⚠ WARNING

Risk of injury due to incorrect maintenance or troubleshooting

- Check the proper functioning of the product, especially the safety features, after every maintenance or troubleshooting operation.

⚠ CAUTION

Leakage of compressed air during installation and maintenance work

Bursting or release of compressed air lines

Risk of injury from powerful airflow, particles and noise.

Damage to hearing and eyes.

Risk of injury from compressed air hoses being slewn around.

- Deactivate the compressed air supply before installation and maintenance work.
- Wear ear protection and protective glasses.

⚠ CAUTION

Risk of injury due to strong vacuum!

- Prior to troubleshooting, the higher-level machine must be disconnected from the power supply, depressurized (vented to the atmosphere) and secured against unauthorized restart.

7.2 Faults, Causes, Solutions

Also see the following documents in the appendix:

- Ejector module operating instructions
- Vacuum switch operating instructions

Fault	Cause	Solution
The load cannot be held. The minimum vacuum is not reached or builds up too slowly.	The sealing plate or suction cups are damaged.	▸ Replace the sealing plate or suction cups.
	The compressed air supply hose or compressed air connection is not leak-tight.	▸ Seal or replace leaking components.
	The ejector modules are incorrectly connected.	▸ Check the electric and compressed air connection.
	The ejector modules are dirty.	▸ Clean the ejector modules.
	The input pressure on the ejector module is too low.	1. Increase the input pressure. 2. Check the compressed air supply line.
	The load is too heavy.	▸ Observe the maximum permissible lift capacity (> See ch. General parameters). Increase the vacuum or use another gripper.
	The internal diameter of the compressed air/vacuum hoses is too low.	▸ When retrofitting the gripper, for example, install larger flow restrictors or more flow restrictors or add additional ejector modules.
	When using suction cups: The opening on the flow restrictors is too large, therefore the vacuum generated is not sufficient.	▸ Adjust the vacuum generator.
	The seals between the suction trough and the change plate are leaking.	▸ Check the seals and replace if necessary.
	The flow restrictors/check valves are dirty.	▸ Clean the flow restrictors/ check valves.
	The flow restrictors are too small.	▸ For air-permeable loads, use a larger flow restrictor if necessary. Replace the quick change plate.
	The flow restrictors are too small.	▸ For air-permeable loads, use a larger flow restrictor if necessary. Replace the quick change plate.

Fault	Cause	Solution
	The masking film is dirty (FQE-V only).	▸ Clean the masking film or replace it if necessary (> See ch. 8.7.2 FQE-V-M/X, p. 48).
	The vacuum supply hose or screw unions are leaking.	▸ Seal or replace leaking components.
	The gripper is lifted too quickly or jerkily.	1. Extend the retention time of the gripper on the load during suction. 2. Slow the lifting process and avoid acceleration peaks.
	The gripper is not pressed sufficiently onto the load to be lifted.	▸ Increase the contact pressure. On even surfaces, it is advisable to compress the sealing plate or the suction cups by at least 50%.
	The load is not suitable for the gripper. • The suction area is too small. • The suction area is not airtight.	Use a different gripping system.
Version Xc: The solenoid valve control does not work.	The solenoid valve is not connected correctly.	▸ Check the electrical connection and PIN assignment.
	The solenoid valve is faulty.	Contact the Schmalz service department.
	A solenoid valve does not close or open completely. The pilot pressure is insufficient or too high.	▸ Check the compressed air supply.
The sealing plate or suction cups wear out very quickly.	The gripper is placed on the load at an angle or is dragged across the workpiece.	▸ Place the gripper vertically on the load.

8 Maintenance

8.1 Safety Instructions for Maintenance

Maintenance must be carried out only by qualified mechanical, pneumatics and electrical specialists.

Personnel must have read and understood the instructions.

⚠ WARNING

Unexpected movement of the handling system during maintenance or repair work

Serious injury or death!

- Before carrying out maintenance or repair work, ensure that the handling system cannot start unexpectedly.

⚠ WARNING

Risk of injury due to incorrect maintenance or troubleshooting

- Check the proper functioning of the product, especially the safety features, after every maintenance or troubleshooting operation.

⚠ CAUTION

Leakage of compressed air during installation and maintenance work

Bursting or release of compressed air lines

Risk of injury from powerful airflow, particles and noise.

Damage to hearing and eyes.

Risk of injury from compressed air hoses being slewn around.

- Deactivate the compressed air supply before installation and maintenance work.
- Wear ear protection and protective glasses.

⚠ CAUTION

Risk of injury due to strong vacuum!

- Prior to installation and before maintenance work, the higher-level machine must be disconnected from the power supply, depressurized (vented to the atmosphere) and secured against unauthorized restart.

8.2 Maintenance Schedule

Schmalz stipulates the following checks and inspection intervals. The operator must comply with the legal regulations and safety regulations applicable at the location of use. These intervals apply to single-shift operation. For heavier use such as multi-shift operation, the intervals must be shortened accordingly.

Also see the following documents in the appendix:

- Ejector module operating instructions
- Vacuum switch operating instructions

Maintenance task	Wkly	Mthly	3-mthly	6-mthly	Annually
Check the load-bearing screw connections and retighten if required.	X				X
Check the ejector modules for abnormal noise under full load.	X				X
Check the function of the solenoid valves (audible switching process).	X				X
Check the function of the vacuum switch.	X				X
Remove the ejector modules, and carefully blow them out with compressed air.		X			X
Inspect suction cups for damage and cracks and clean; replace if worn.		X			X
Inspect the sealing plate for damage and cracks and clean; replace if worn. To replace the sealing plate, perform the following steps:		X			X
FQE-V with sealing plate: Check the masking film for dirt, if necessary, extract dirt from the outside. Replace the masking film, if necessary.		X			X
Vacuum the filter disks in the suction cups from the outside. If necessary, replace the filter disks or suction cups.		X			X
Check the load-bearing parts for deformation, wear or other damage.		X			X
Check connections for tightness, e.g. bolts, hose clamps, etc.				X	X
Check the electrical installation and cable screw unions.				X	X
Check the legibility of the type and lift capacity plates. Clean if necessary.					X
Check the general condition of the product.					X

- Ensure that the Assembly instructions is available, legible and accessible to staff.

8.3 Cleaning the Gripper

NOTE

Aggressive cleaning agent

Damage to the suction plates and vacuum hoses!

- Clean suction plates only with an agent containing active tensides.
- Also clean mechanically (soft brush or ultrasonic).
- Do not use aggressive cleaning agents such as cold cleaners, carbon tetrachloride, hydrocarbons or vinegar-based cleaning products.
- Do not use sharp-edged objects (wire brushes, sandpaper, etc.).

NOTE

Moisture ingress

Damage to the electronics!

- During cleaning, make sure that no moisture gets into the electronics.

NOTE

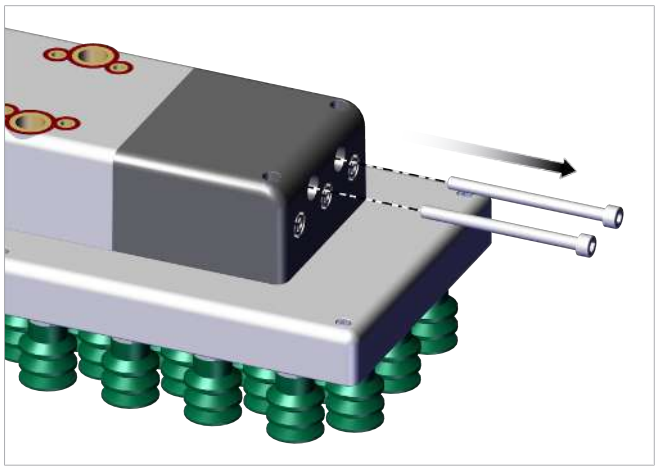
Damage to the sealing plate due to compressed air!

- The sealing plate must not be cleaned with compressed air.

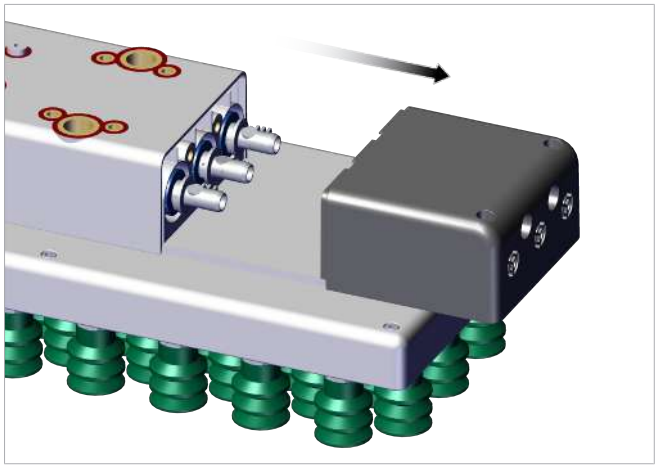
- Only use cleaning agents with a pH between 7 and 12.
- Remove dirt on the exterior of the device with a soft cloth and soap suds at a maximum temperature of 60° C.

8.4 Removing the Ejector Module

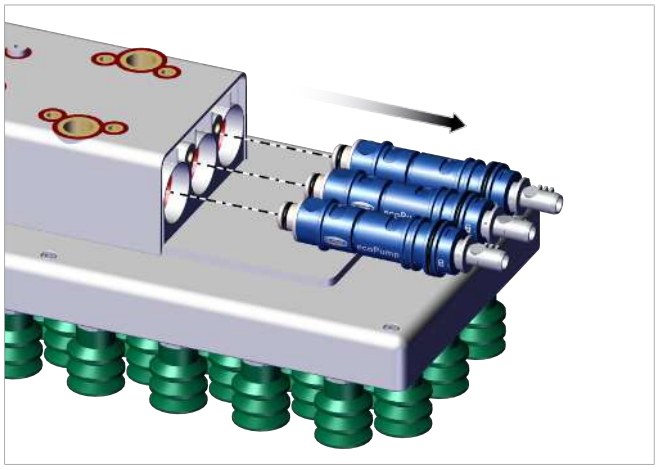
The following steps apply to all sizes of the versions Xb and Xc.



- Loosen the fastening screws.



- Remove the silencercap.



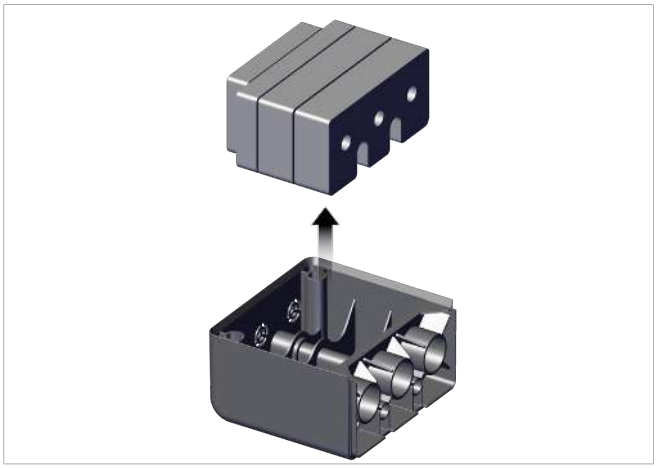
1. Pull out the ejector modules (2 or 3).
2. For information on cleaning the ejector module, see the operating instructions in the appendix.

During mounting, make sure the silencer cap is seated correctly on the basic module.

8.5 Removing and Cleaning the Silencers

The following steps apply to all sizes of the version Xb and Xc (> See ch. 8.4 Removing the Ejector Module, p. 45).

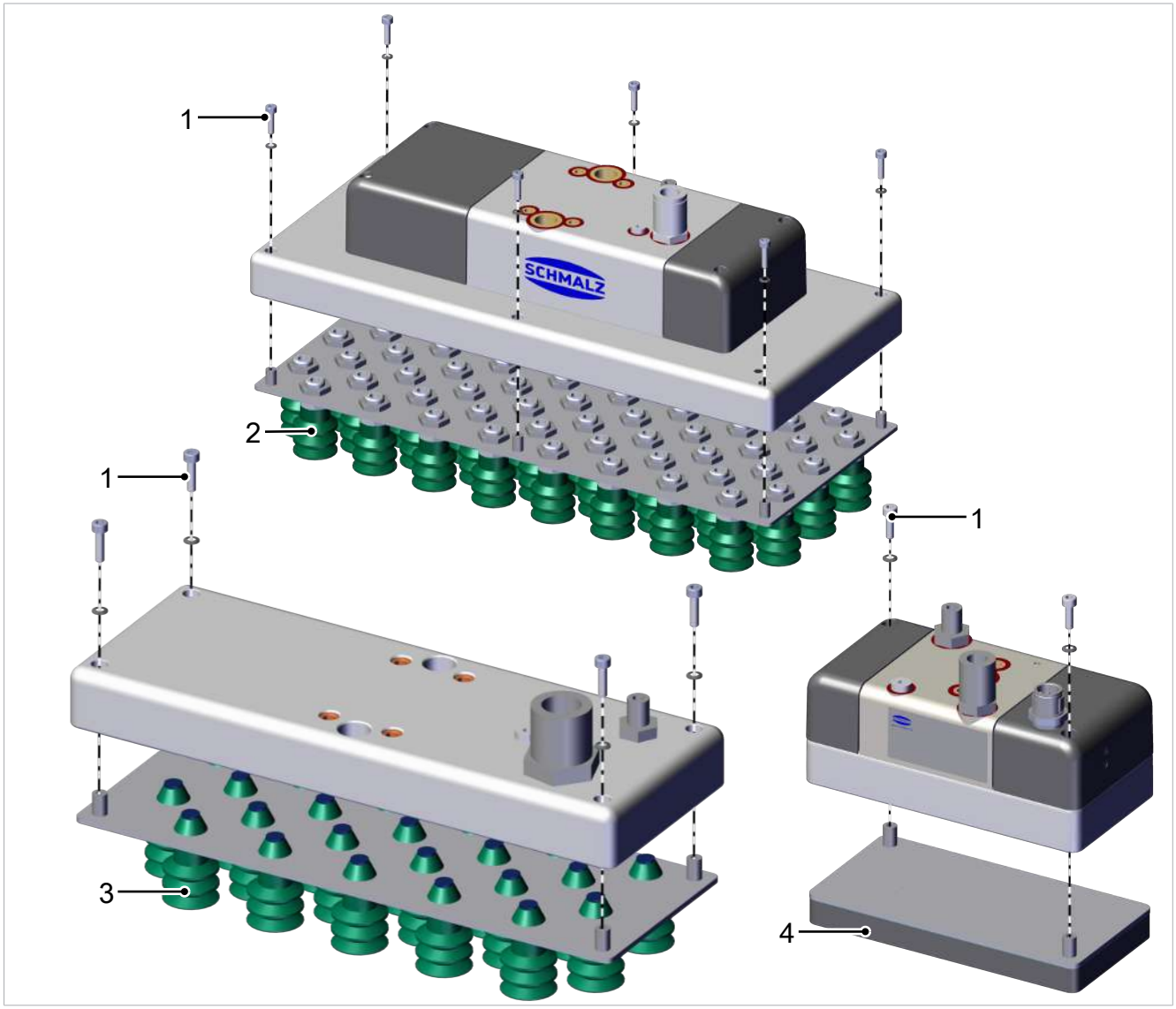
1. Depending on the version, remove 1 to 4 silencer sections from the silencer cap.



2. Clean the silencer sections with a soft brush.

8.6 Removing the Sealing/Suction Plate

The following steps do not apply to version FQE-V.



1	Screw	3	Suction plate with plug-in suction cups
2	Suction plate with screw-in suction cups	4	Suction plate with sealing plate

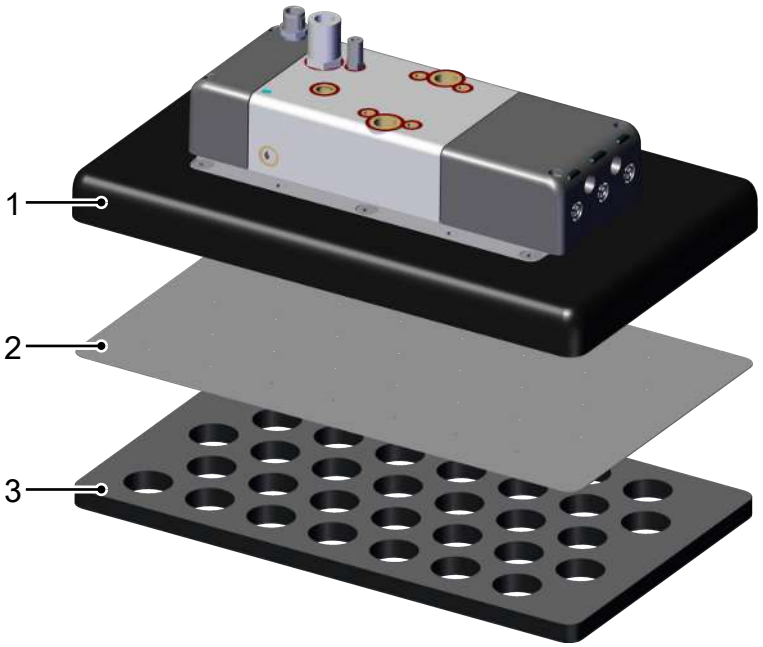
1. Secure the suction plate (2 / 3 / 4) with four M4 machine screws (1) and washers.
2. Tighten the M4 machine screws with a torque of 3.0 Nm.

8.7 Replacing the Sealing Plate

8.7.1 FQE-M/X

1. Remove the worn sealing plate from the mounting plate.
2. Clean the mounting plate. The surface must be free from grease and adhesive residues.
3. Remove the protective film from the new sealing plate.
4. Slide the new sealing plate onto the mounting plate.

8.7.2 FQE-V-M/X



1	Suction plate	3	Sealing plate
2	Masking film (for flow restrictor, version FQE-V only)		

1. Remove the worn sealing plate (3) from the masking film (2).
2. If necessary, carefully remove the masking film (2) from the suction plate (1).
   ⇨ The masking film can be reused depending on the condition.
3. Clean the underside of the suction plate. The surface must be free from grease and adhesive residues.
4. Peel off the protective film from the new masking film.
5. Apply the new masking film to the suction plate.
6. Remove the protective film from the new sealing plate.
7. Clean the underside of the masking film. The surface must be free from grease and adhesive residues.
8. Place the new sealing plate onto the masking film.

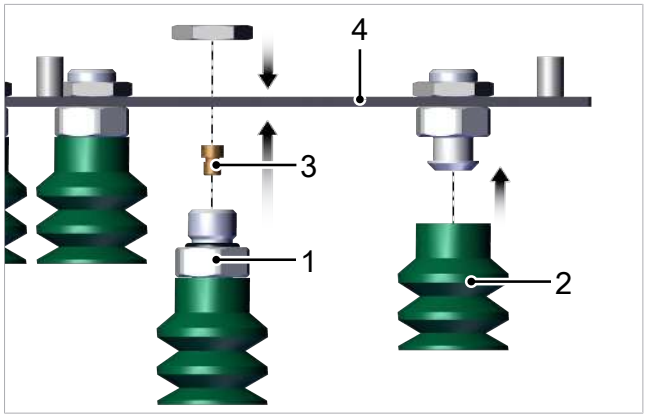
8.8 Replacing Screw-in Suction Cups

8.8.1 FQE-M/X

The screw-in suction cups can be changed in 2 ways:

- Unscrew the entire screw-in suction cup (1) from the mounting plate (4).
- Replace the suction cup (2) by pulling it off the suction cup connection nipple.

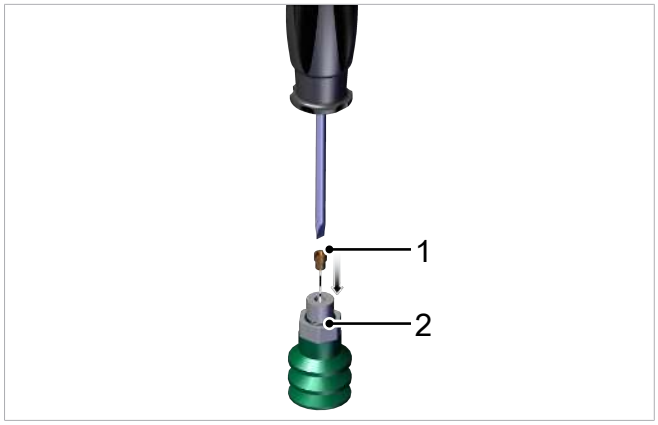
If required, the screw-in nozzle (flow restrictor) (3) can also be replaced.



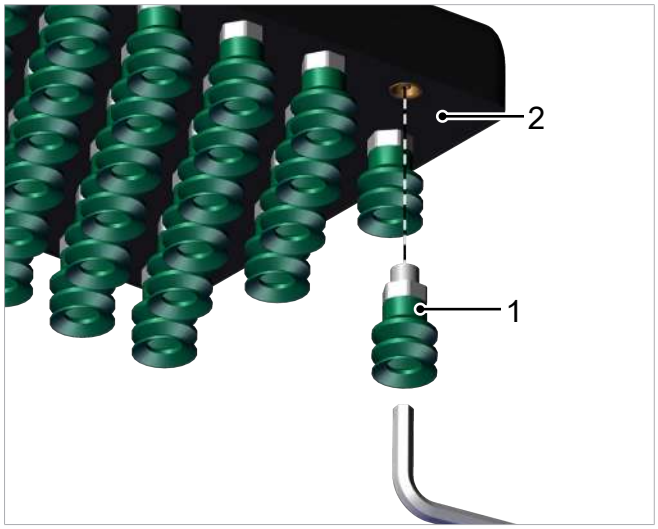
1	Screw-in suction cup	3	Screw-in nozzle (flow restrictor)
2	Suction cup	4	Mounting plate

8.8.2 FQE-V-M/X

1. Screw the screw-in nozzle (flow restrictor) (1) into the suction cup connection nipple (2) with a screwdriver.



2. Screw the entire screw-in suction cup (1) into the suction plate (2) with a tightening torque of 5 Nm.

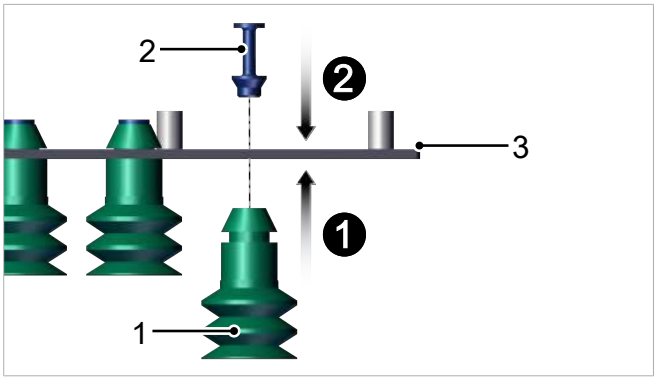


8.9 Replacing Plug-in Suction Cups

8.9.1 FQE-M/X

The plug-in suction cup is destroyed during disassembly.

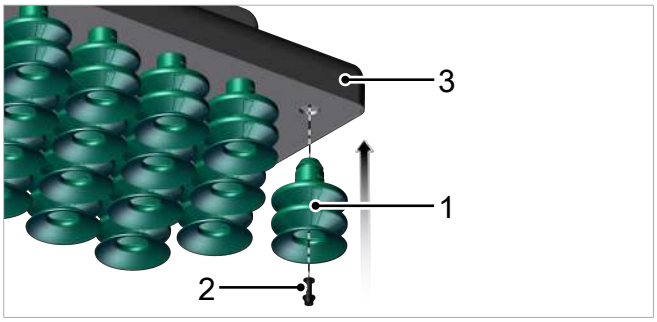
1. Insert the plug-in suction cup (1) into the mounting plate (3) from below ❶.



2. Insert the flow restrictor (2) into the plug-in suction cup (1) from above ❷.

8.9.2 FQE-V-M/X

- Insert the plug-in suction cup (1) with the flow restrictor (2) into the suction plate (3).



8.10 Spare and Wearing Parts

- For spare parts orders, have the information on the type plate to hand.

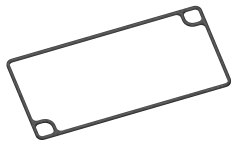
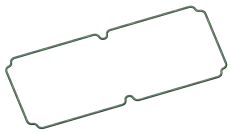
Figure	Designation	Part no.	Description	Spare / Wearing part
	Sealing plate (FQE)	10.01.44.00047	Sealing for suction trough, 120x60	S
	Sealing plate (FQE)	10.01.44.00037	Sealing for suction trough, 220x80	S
	Sealing plate (FQE)	10.01.44.00050	Sealing for suction trough, 300x130	S
	Ejector module	10.02.01.01343	SEP HF 2 06 13	S
	Ejector module	10.02.01.01347	SEP HF 2 13 22	S
	Plug	10.01.44.00061	Instead of ejector module 2-13-22	S
	Silencer insert	10.01.44.00021	for 120x60	S
	Silencer insert	10.01.44.00116	for large version/ set consisting of 4 parts	S
	Silencer cap	10.01.44.00001	small	S

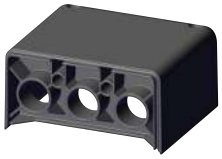
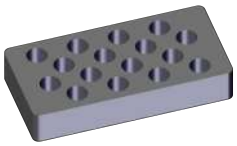
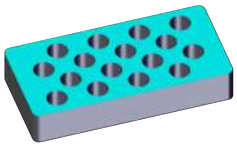
Figure	Designation	Part no.	Description	Spare / Wearing part
	Silencer cap	10.01.44.00030	large	S
	Sealing plate	10.01.44.00007	120x60 O10	W
	Sealing plate	10.01.44.00137	120x60 O20	W
	Sealing plate	10.01.44.00140	120x60 O10O10F	W
	Sealing plate	10.01.44.00058	220x80 O10	W
	Sealing plate	10.01.44.00156	220x80 O20	W
	Sealing plate	10.01.44.00176	220x80 O10O10F	W
	Sealing plate	10.01.44.00052	300x130 O10	W
	Sealing plate	10.01.44.00180	300x130 O20	W
	Sealing plate	10.01.44.00189	300x130 O10O10F	W

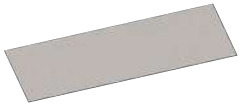
Figure	Designation	Part no.	Description	Spare / Wearing part
	Protection cover	10.01.44.00152	120.5x60.5 SU	W
	Protection cover	10.01.44.00173	218x78 SU	W
	Protection cover	10.01.44.00185	298x128 SU	W
	Bellows suction cup	10.01.06.03125	SPB2 20 SI-40 P	W
	Flow restrictor	10.05.04.00090	SW-80-P-7.3	S
	Flow restrictor	10.05.04.00091	SW-100-P-7.3	S
	Flow restrictor	10.05.04.00092	SW-130-P-7.3	S
	Bellows suction cup	10.01.44.00131		W
	Bellows suction cup	10.01.06.03409		W
	Filter screen	10.01.06.02567	FD 18,120	W

Figure	Designation	Part no.	Description	Spare / Wearing part
	Screw-in nozzle (flow restrictor)	10.05.04.00022	SW60	S
	Screw-in nozzle (flow restrictor)	10.05.04.00024	SW80	S
	Screw-in nozzle (flow restrictor)	10.05.04.00026	SW100	S
	Screw-in nozzle (flow restrictor)	10.05.04.00087	SW130	S

9 Accessories

Accessories can be requested from the Schmalz Service department using the information on the type plate.

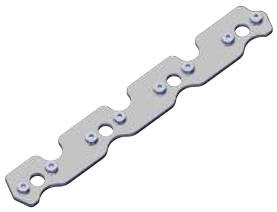
General accessories

Figure	Designation	Part no.	Note
	Connection cable	21.04.05.00080	Straight
	Connection cable	21.04.05.00557	Angled
	Vacuum gauge	10.01.44.00249	Analog
	Vacuum/pressure switch	10.06.02.00577	VSi

Accessories for gripper size 120 x 60 mm

The following accessories cannot be used for version FQE-V.

Figure	Designation	Part no.	Note
	Connecting plate	10.01.44.00195	For mounting two grippers 120x60 mm incl. screws
	Connecting plate	10.01.44.00194	For mounting three grippers 120x60 mm

Figure	Designation	Part no.	Note
	Connecting plate	10.01.44.00193	For mounting four grippers 120x60 mm

Accessories for 220 x 80 mm / 300 x 130 mm

The following accessories cannot be used for version FQE-V.

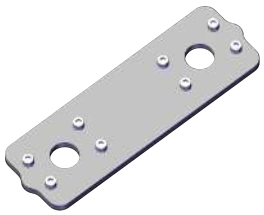
Figure	Designation	Part no.	Note
	Connecting plate	10.01.44.00203	For mounting two grippers 220x80 mm
	Connecting plate	10.01.44.00209	For mounting three grippers 220x80 mm
	Connecting plate	10.01.44.00208	For mounting four grippers 220x80 mm
	Connecting plate	10.01.44.00202	For mounting two grippers 300x130 mm
	Connecting plate	10.01.44.00210	For mounting three grippers 300x130 mm
	Connecting plate	10.01.44.00205	For mounting four grippers 300x130 mm

Figure	Designation	Part no.	Note
	Adapter plate	10.01.44.00204	1/4" spring plunger adapter
	Adapter plate	10.01.44.00212	1/2" spring plunger adapter

10 Disposal

Recover the disassembled parts for recycling or reuse (provided no agreement on return or disposal has been made).

1. Dispose of the product properly after replacement or decommissioning.
2. Observe the country-specific guidelines and legal obligations for waste prevention and disposal.

For proper disposal, please contact a company specializing in the disposal of technical goods and instruct the company to observe the applicable disposal and environmental regulations. Schmalz is happy to assist you in finding a suitable company.

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