vacuubrand

Technology for Vacuum Systems

PUMP MODULE

VAC 24 SEVEN

#5 mbar
#70 mbar

Instructions for use

Original instructions
Keep for further use!

This manual is only to be used and distributed in its complete and original form. It is strictly the user's responsibility to carefully check the validity of this manual with respect to the product.

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*Thank you for purchasing this product from **VACUUBRAND GMBH + CO KG** . You have chosen a modern and technically high quality product.*

TABLE OF CONTENTS

1 About this document

This manual is part of a modular manual compiled in a binder.

1.1 User information

1.1.1 Descriptions of the pump module

In this section of the manual, you will find descriptions for the ***pump module*** of the vacuum pumping unit.

Manual module	Content
VAC 24seven_Pump	Pump module Pump unit for VAC 24seven

- ⇨ Read this manual thoroughly and completely before putting the product into operation.
- ⇨ Observe the safety information in the system description VAC 24seven_System.
- ⇨ Observe supplementary safety information and warnings in this description.

1.1.2 Safety

Intended use

Intended use

The pump module is part of the VAC 24seven vacuum pumping unit and is designed for the generation of vacuums in systems intended for this purpose.

Any other use is considered improper use.

Only use a pump module if it is in perfect working condition.

1.1.3 In this manual

Information about the manual

- The illustrations in this manual are only intended to facilitate comprehension.
- We reserve the right to make technical and design changes in the course of continuous product improvement.

1.2 Symbols and icons

Symbols and icons are used in this manual to help you understand descriptions more easily.

Explanation of symbols and icons

✓	Positive example – **Do this!** Result – **OK**
✗	Negative example – **Don't do this!**
	Refers to content in this manual.
	Refers to content of other supplementary documents.
	General mandatory sign.

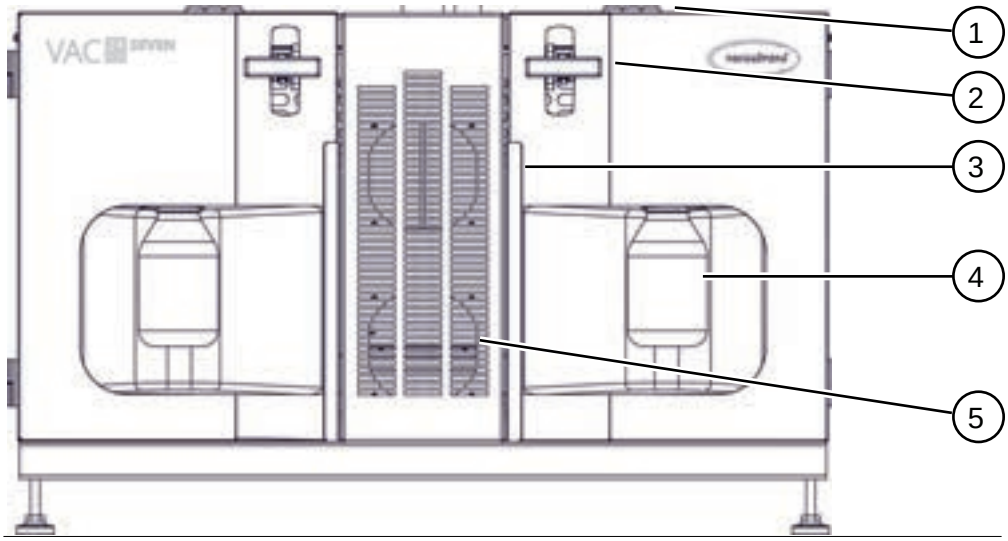
⇨ You will find further, detailed descriptions of symbols (icons) in the system description VAC 24seven_System.

2 Description of pump module

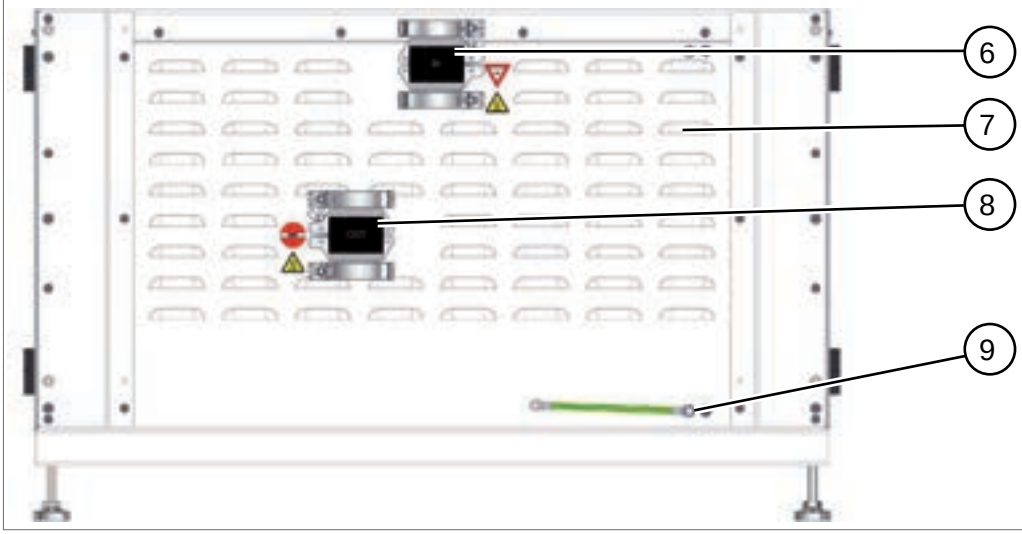
2.1 Product description

Pump module views

→ Example
Pump module front view

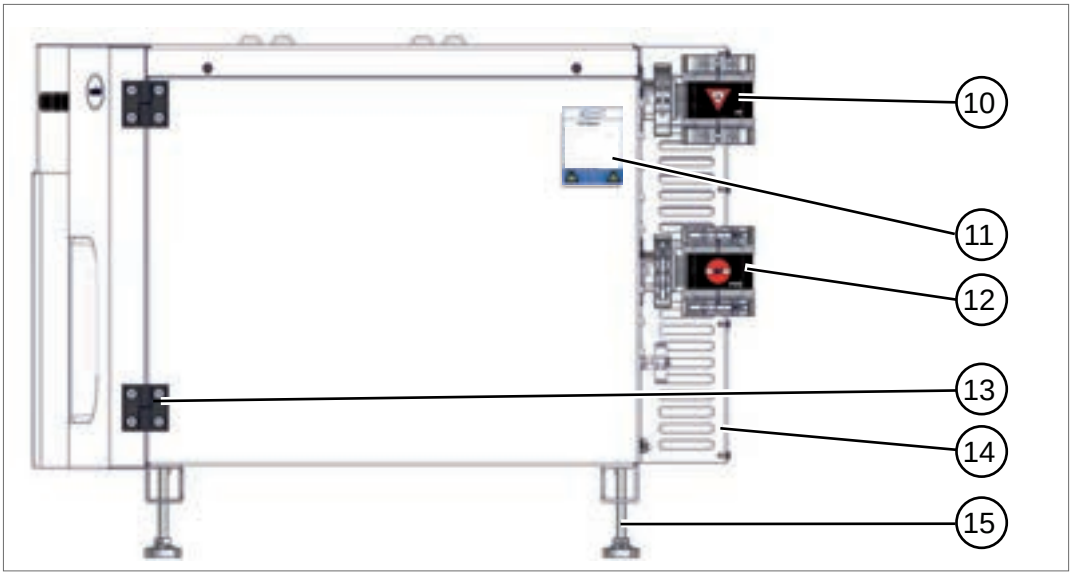


→ Example
Pump module rear view



1	Centering devices for adjustable feet of the control module
2	Isolation valve for vacuum pump suction line, rotary handle also serves to lock the door
3	Door handle
4	Condensate catch pot, can be unscrewed
5	Fan grille with filter insert, behind it temperature-controlled fans
6	Inlet IN, KF DN 40
7	Rear wall with ventilation slots
8	Outlet OUT, KF DN 40
9	Grounding cable for connection to further pump module

Pump module side view
(1 cable channel hidden)



10	Inlet IN, KF DN 50 (suction line)
11	Rating plate
12	Outlet OUT, KF DN 50 (exhaust gas line)
13	Door hinge
14	Cable duct
15	Machine feet, screwed in (only in the lowest pump module)

2.2 Function description

Pump module in general

Function description

Depending on the requirements, up to 3 pump modules can be controlled and regulated with one control module.

Pump modules are available in two different versions:

- 5 mbar ultimate vacuum and 30 m³/h pumping speed or
- 70 mbar ultimate vacuum and 40 m³/h pumping speed.

Switching on

The vacuum pumping unit and the connected pumping modules are switched on via the main switch on the control module.

Vacuum pumps

Pump module with speed-controlled diaphragm pumps

At the heart of each pump module are 2 speed-controlled diaphragm pumps for vacuum generation. Individual rocker switches on the control module switch the diaphragm pumps on and off individually.

Vacuum pumps can be switched off, disconnected, and removed individually without affecting the vacuum process, e.g., for service or maintenance purposes. Each individual pump is compact and can be removed and maintained by just one person.

A diaphragm pump generates a dry, oil-free vacuum because of the hermetic separation between suction chamber and drive. The design of the pump heads and its unique stability core provides high chemical resistance.

The diaphragm pumps meet the requirements of ATEX equipment category 3 in the internal, wetted parts area. Applicable for pumping of Ex-mixtures infrequently or for a short period.

Vacuum control

Controller for vacuum control

In the control module, the controller regulates the speed of the diaphragm pumps and thus the vacuum as needed. The diaphragm pumps only run as fast as necessary.

When a vacuum pump is removed, the speed of the other pumps is automatically adjusted by the controller.

Status display for monitoring

Display elements

The operating status of the vacuum pumps is displayed using the light column, the status LEDs, and the rocker switches on the front of the control module.

Connections

Various connections

The following connections are located on the pump module:

- Vacuum connection for the process = suction line.
- Exhaust gas line with the option of connecting a condensate collection tank #20745016 at the outlet.
- Connection option for gas ballast at the control module.
- Suction/pressure distributor with thread for suction-side condensate collection tank (glass flask in front of maintenance door).

In the case of a vacuum pumping unit with several pumping modules, these are connected in parallel using the "connection set", each with a common suction line and exhaust gas line.

3 Operation of the pump module

The vacuum pumping unit is operated at the control module.

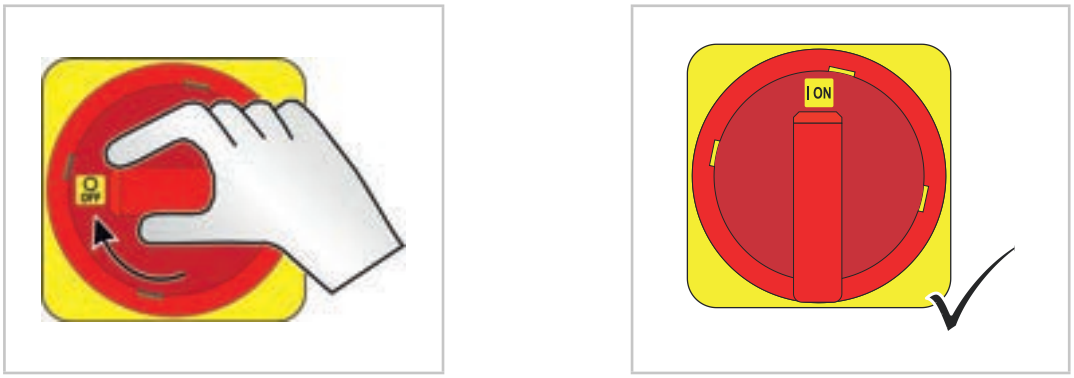
- Switch on/off the vacuum pumping unit,
- Switch vacuum pumps on/off individually,
- Control gas ballast supply.

→ Please read the full description of the operation of the control module in the following manual modules: VAC_24seven_Control and VAC_24seven_ VACUU·SELECT.

3.1 Switch on/off the vacuum pumping unit

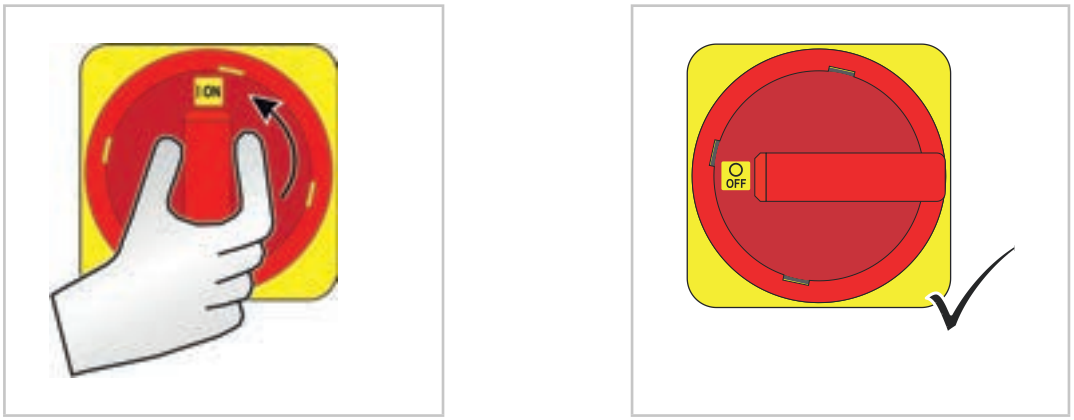
Switch on vacuum pumping unit via control module

Switch on the control module



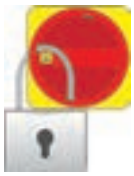
Switch off vacuum pumping unit via control module

Switch off the control module



☑ Control module + pump module switched off.

Main switch with padlock



On the main switch, there are recesses for a padlock to prevent it from being switched on again.

⇨ During electrical work, secure the vacuum pumping unit with a padlock before switching it back on.

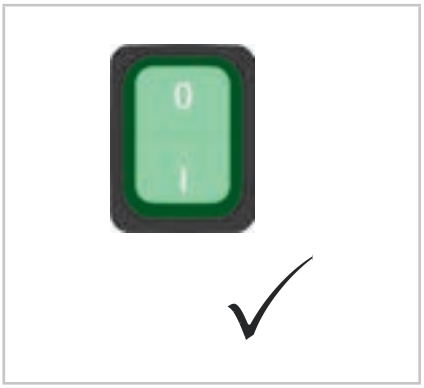
3.2 Switch on/off vacuum pump

After switching on the control module, it may first be necessary to switch on the vacuum pumps of a pump module.

If maintenance must be performed, the vacuum pump of a pump module can be switched off, removed, and serviced separately. After reinstallation, the serviced vacuum pump can be switched on again via the rocker switch.

Switch on vacuum pump

Switch on individual vacuum pump

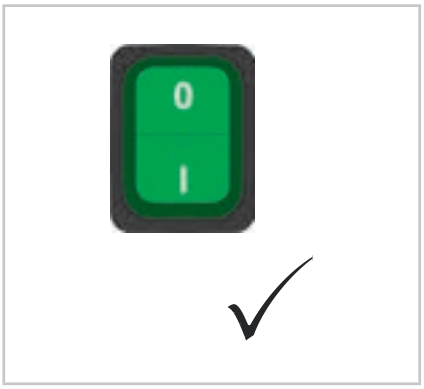


☑ Rocker switch lights up.

☑ Vacuum pump switched on.

Switch off vacuum pump

Switch off individual vacuum pump



☑ Rocker switch does not light up.

☑ Vacuum pump switched off.

Each time a vacuum pump is switched on at the control module, the fans of the corresponding pump module are fully activated for approx. 10 seconds. This allows the function of the fans in the pump module housing to be checked.

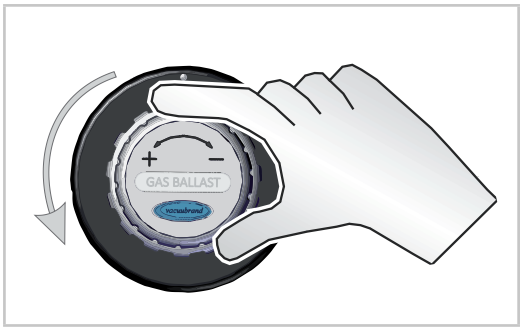
3.3 Gas ballast – control supply

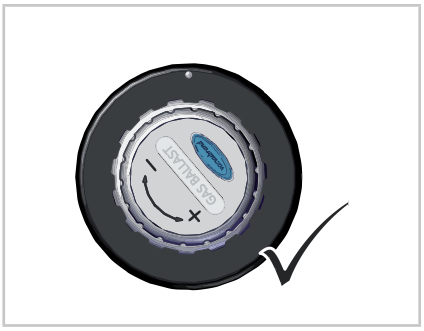
The supply of gas ballast, e.g., air or inert gas, is intended to prevent the formation of condensate in the vacuum pump or to flush possible pump residues out of the vacuum pump.

The "gas ballast valve" is located on the control module for the infinitely variable control of the gas supply.

Open the gas ballast valve

Open gas ballast valve





☑ Air/gas supply open.

Close the gas ballast valve

Close gas ballast valve

☑ Air/gas supply closed.

4 Error remedy

4.1 Error – Cause – Remedy

Error-Cause-Remedy

Error	▸ Possible cause	✓ Remedy	Personnel
Sensitive process not controllable	▸ Speed too high ▸ Pumping speed too high	✓ Reduce speed	Operator, specialist
Vacuum pump does not run	▸ Vacuum pump switched off	✓ Switch on vacuum pump at rocker switch.	Operator
	▸ Plug-in connector to vacuum pump disconnected.	✓ Check plug-in connector and reconnect if necessary.	Operator
	▸ Overpressure in the outlet (exhaust) line.	✓ Open up exhaust gas line.	Operator
	▸ Vacuum pump motor overloaded. ▸ Thermal fault of vacuum pump.	✓ Allow motor to cool down, determine and eliminate cause of overload. Only manual reset possible: → Switch off pump or pull out power plug.	Specialist
No suction power	▸ Leak in the suction line or in the apparatus. ▸ Condensate catch pot not screwed in correctly. ▸ Condensate catch pot not installed. ▸ Centering ring in the small flange does not fit properly.	✓ Check suction line and apparatus for possible leaks. ✓ Check condensate catch pot and screw in correctly. ✓ Check centering rings for correct positioning. ✓ Check apparatus for leaks.	Operator
	▸ Vacuum line too long.	✓ Use vacuum lines with a larger cross-section.	Resp. specialist
	▸ Condensate inside the vacuum pump	✓ Allow vacuum pump to run for a few minutes with the suction nozzle open.	Operator
	▸ Deposits inside the vacuum pump	✓ Clean and check pump heads.	Specialist
	▸ Diaphragms or valves defective.	✓ Replace diaphragms and valves.	Specialist
	▸ High level of vapor generated in the process.	✓ Check process parameter.	Specialist
Loud operating noises	▸ No hose installed.	✓ Check hose and install it right.	Operator
	▸ Diaphragm clamping disc loose.	✓ Service the vacuum pump and replace defective parts.	Specialist
	▸ Outlet pipe open.	✓ Check exhaust gas line connections. ✓ Connect the outlet pipe to an exhaustion system, e. g., fume hood.	Specialist

Error-Cause-Remedy

Error	▸ Possible cause	✓ Remedy	Personnel
Pump module gets too hot	▸ Fan fabric clogged. ▸ Fan front covered. ▸ Fan failure. ▸ Media temperature too high; > 40 °C. ▸ Ambient temperature too high; > 45 °C.	✓ Test the fan function: Briefly switch the vacuum pumps of pump module OFF and ON again ⇨ Fans are fully activated for 10 seconds. ✓ Clean fan fabric. ✓ Remove covers in front of the fan. ✓ Operate at lower pressure to reduce media temperature. ✓ Replace defective parts. ✓ If the ambient temperature is high, use room cooling or a similar device.	

4.2 Technical support

Technical support

For technical assistance or in the event of an error, please contact our Service Department.

⇨ To identify errors and potential remedies, please refer to the troubleshooting table ***Error – Cause – Remedy***.

Operate the machine only when it is in proper working condition.

⇨ Observe the recommended maintenance intervals to ensure a fully functional system.

5 Service work

NOTE

Damage possible if work is performed incorrectly.

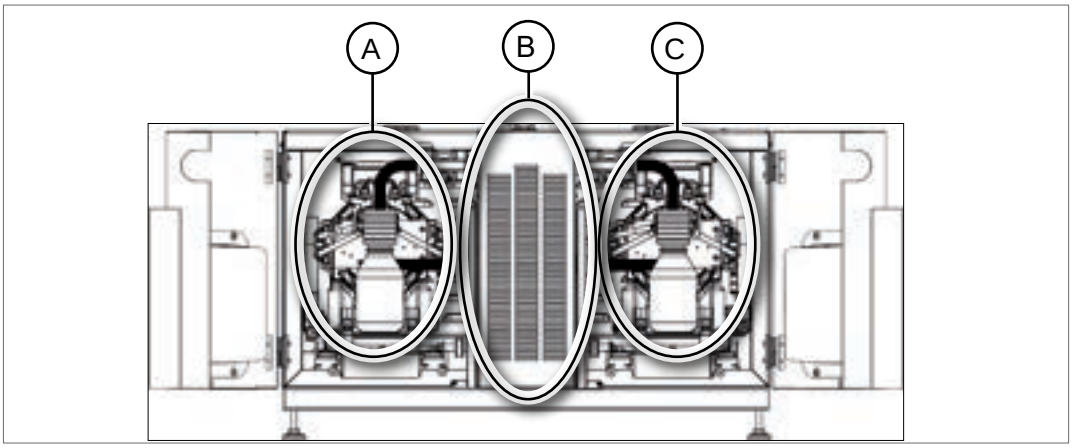
⇨ Have maintenance work performed by a trained professional or at least by a trained person.

⇨ Recommendation: Please read before the first maintenance the complete instructions once to get an overview of the required service work.

5.1 Recommended maintenance intervals

→ Example

Front pump module with open maintenance doors



Recommended maintenance intervals

	Maintenance intervals*	monthly	15,000 h	40,000 h	If required
A	**Left vacuum pump**				
C	**Right vacuum pump**				
	Replace the diaphragms		x		
	Replace the valves		x		
	Replace O-rings		x		
	Clean or replace molded PTFE hose				x
B	**Air inlet**				
	Check fan fabric	x			
	Clean or replace fan fabric		x		
	Fan visual/ function check			x	
	Replace fan				x

* **Recommended maintenance interval after operating hours** and under normal operating conditions; depending on the environment and area of application, we advise performing cleaning or replacing spare parts as needed.

5.2 Pump module – remove vacuum pump

The removal of a vacuum pump is provided for in the following cases:

- Service work such as cleaning and maintenance
- Repairing a vacuum pump
- Replacing a vacuum pump

Remove vacuum pump

DANGER

Release of hazardous substances through open exhaust pipe.

Risk of poisoning from the emission of gases or vapors that can be harmful or fatal.

⇨ When handling chemicals, wear your personal protective equipment.

⇨ If hazardous substances are pumped, switch off **all** vacuum pumps for service work.

⇨ Close immediately after uncoupling the outlet pipe of the diaphragm pump with a blanking plug.

Switch off vacuum pump at control module

DANGER!
Danger due to pumped hazardous substances.

⇨ Switch off **all** vacuum pumps during maintenance, in case that hazardous substances are pumped.

1. Switch off the rocker switch of the vacuum pump you want to take out.
   - ☑ Rocker switch light OFF.
   - ☑ After approx. 20 sec., status LED turns **YELLOW**.
2. Unscrew the catch pot and empty the flask if necessary. Put aside the empty condensate catch pot.

IMPORTANT!

Note the following during maintenance work:

If the pumping unit is operated at the ultimate vacuum with closed gas ballast valve, a slight increase in pressure is possible while, for example, the flask is emptied or a vacuum pump is removed for service work.

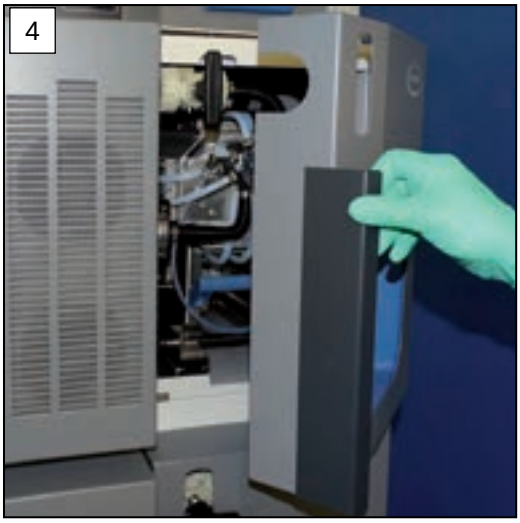
⇨ Coordinate the maintenance work with the specialist department responsible for the application.

Unscrew catch pot, open maintenance door

3. Turn the black handle of the isolation valve 90° in either direction.

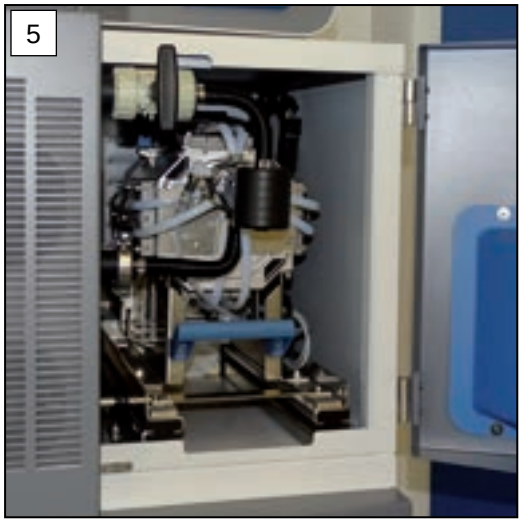
☑ Handle in vertical position.

☑ In-line solenoid valve closed.

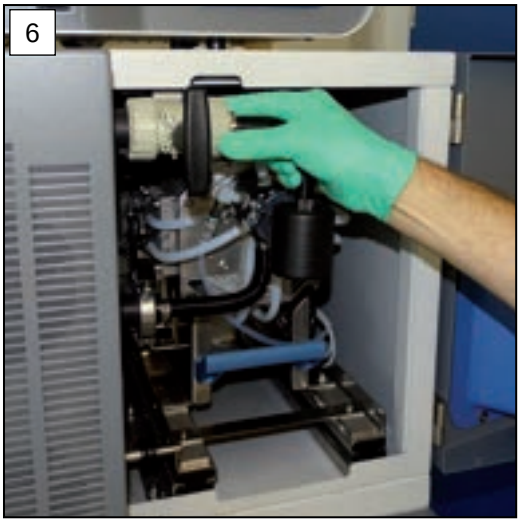


4. Open the maintenance door.

Remove vacuum pump

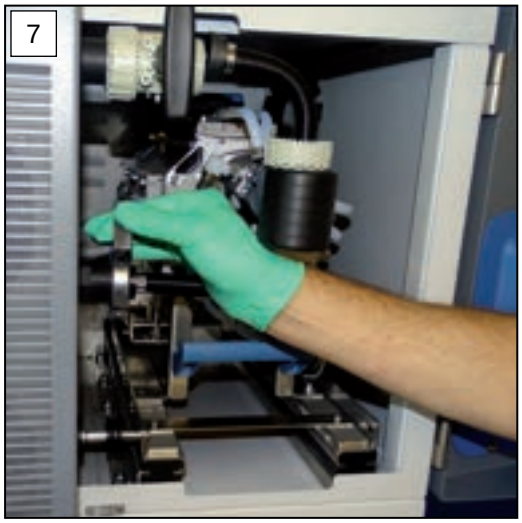


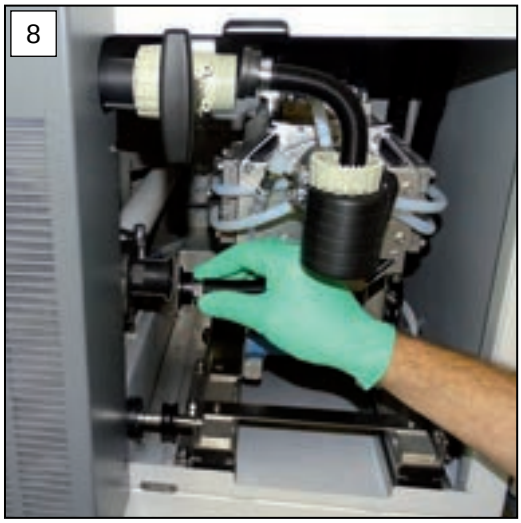
5. Open the maintenance door wide enough for easy access to the vacuum pump.



6. Open the ring from the suction line at the top.

Remove vacuum pump





WARNING!
Risk of burns due to hot exhaust gas pipe.

⇨ Wear heat-resistant safety gloves.

⇨ Switch off the parallel vacuum pump as long as the exhaust gas line is open.

7. Remove the clamping ring from the outlet pipe below.

IMPORTANT!

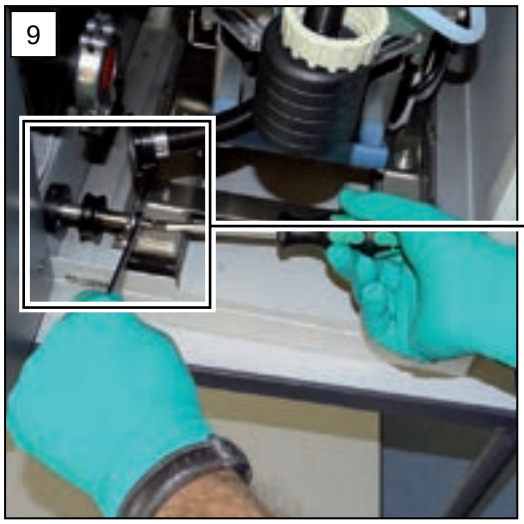
⇨ Close the outlet pipe immediately after uncoupling from the vacuum pump, otherwise gas escapes permanently.

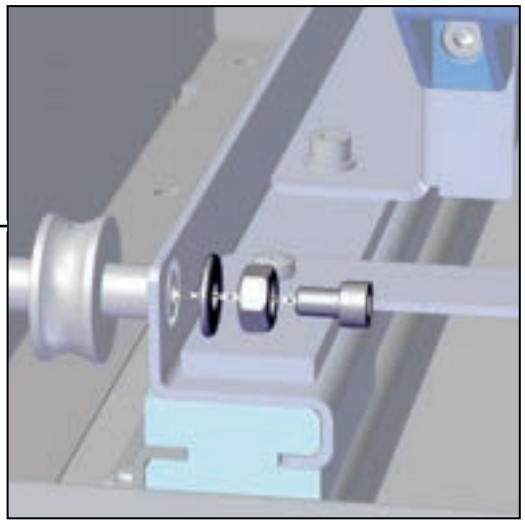
8. Remove the centering ring from the outlet pipe and place the DN20 red* blind flange on it.
Fix the centering ring and the cap with the clamping ring at the small flange and switch on the parallel vacuum pump again.

** -> Cap from maintenance set #20696881.*

Remove vacuum pump

Remove transport lock





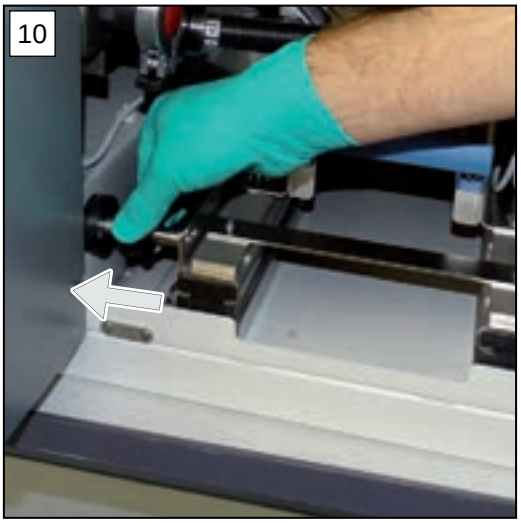
9. Fix the hexagon nut with a fork wrench size SW 10 and unscrew the hexagon socket screw. Hex key size 5

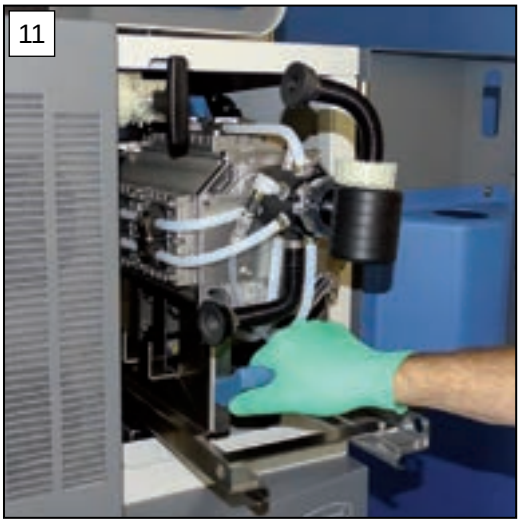
☑ Transport lock can be moved.

Fittings of the transport lock.

IMPORTANT!

⇨ Keep the transport lock for a possible later transport.





10. Push back the transport lock.

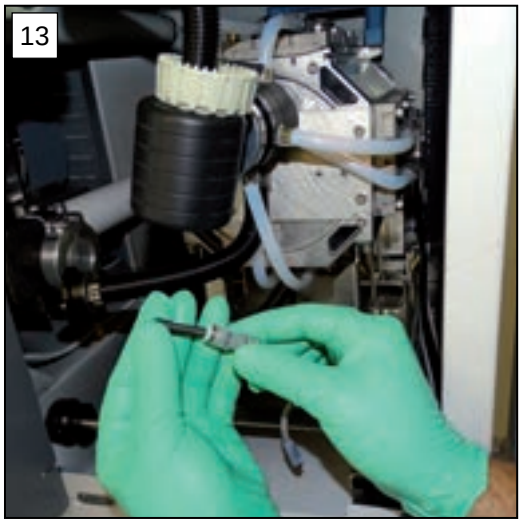
☑ Transport lock opened.

☑ Vacuum pump can be pulled out.

11. Use the handle to pull out the vacuum pump up to the stop.

Remove vacuum pump

12. Push back the metal ring of the plug coupling and pull out the gas ballast hose.



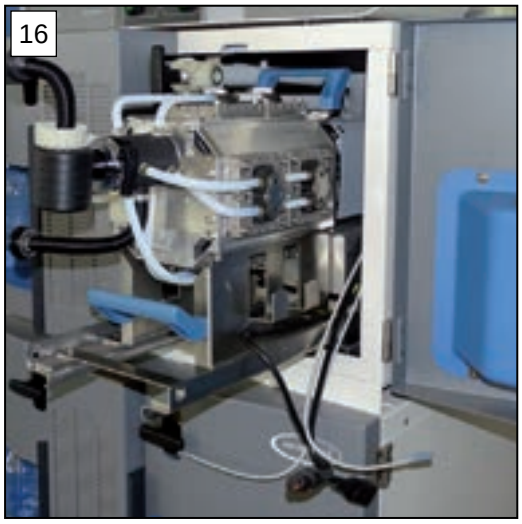
13. Close the gas ballast hose with a blanking plug.

NOTICE
Depending on the type of vacuum pump and the installation position, the gas ballast hose can also be fit on the side.

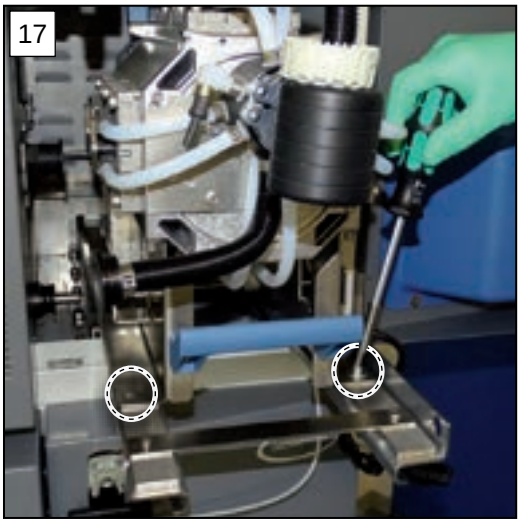
14. Unplug the mains plug (= cold-device plug).

15. Disconnect the VACUU BUS cable.

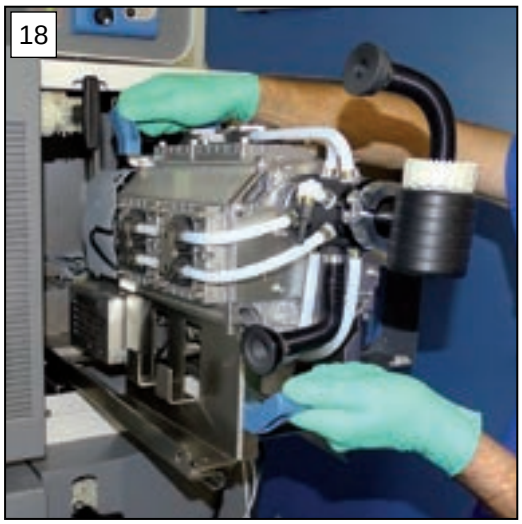
Remove vacuum pump



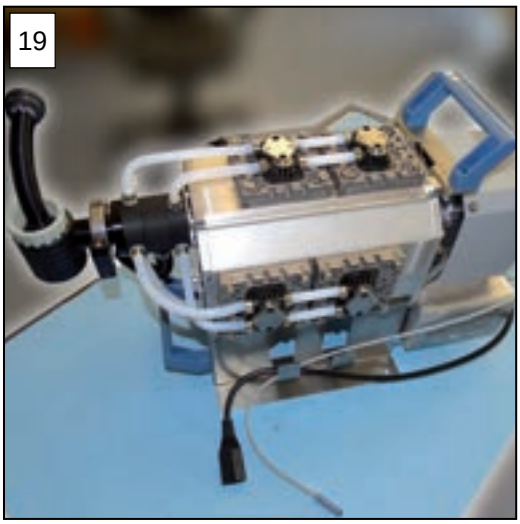
16. Put aside the cable of the vacuum pump.



17. Unscrew the 2 hexagon socket screws, which fix the vacuum pump. Hex key size 5.



18. Take out the vacuum pump with both handles.



19. Place the vacuum pump on a stable, sufficiently load-bearing surface.

☑ Vacuum pump prepared for maintenance work.

5.3 Information on service work

WARNING

Risk of injury from hazardous substances and contaminated components.

Pumping hazardous media can result in hazardous substances adhering to internal parts of the pump.

⇨ Always wear your personal protective equipment when performing activities which may bring you into contact with hazardous substances, e.g., protective gloves, eye protection, and, if necessary, respiratory protection.

⇨ Decontaminate the vacuum pump before opening it. If necessary, have the vacuum pump decontaminated by an external service provider.

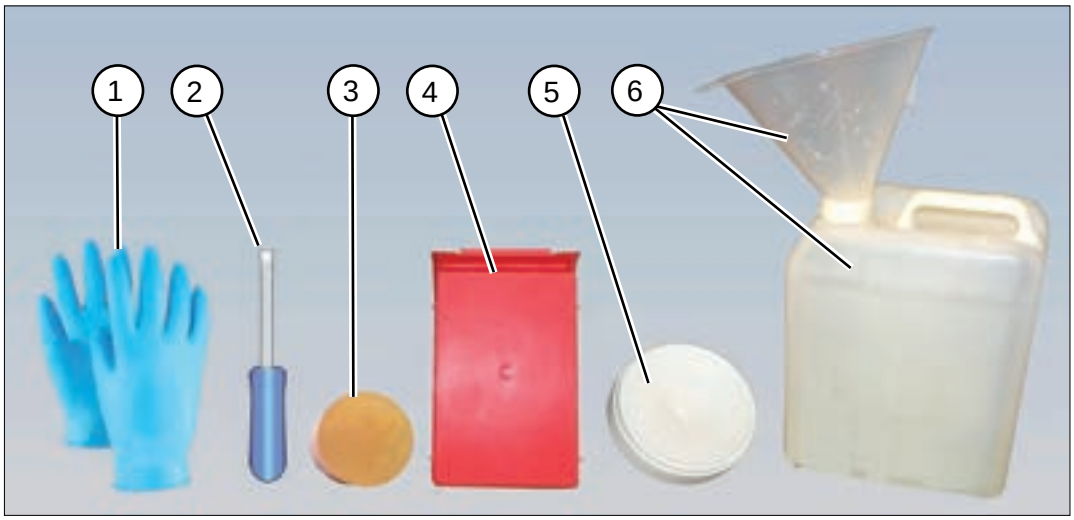
⇨ Take safety precautions according to the instructions you have received on handling hazardous substances.

5.3.1 Aids, tools, and spare parts

Overview of recommended aids

→ Example

Recommended aids for cleaning and maintenance



No.	Aids
1	Protective gloves
2	Sturdy plastic rod or plastic spatula
3	Rubber plug or similar
4	Toolbox or similar
5	Round bottom flask stand
6	Chemical-resistant vessel + funnel

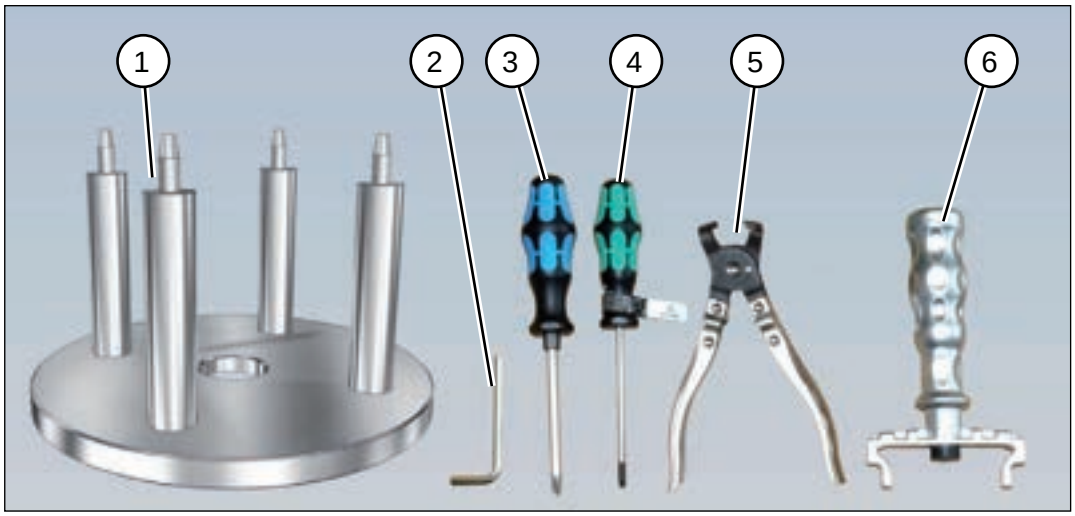
IMPORTANT!

⇨ Use suitable tools for maintenance work so that you can stably set up the vacuum pump in the various positions.

Tool set from accessories, recommended

→ Example

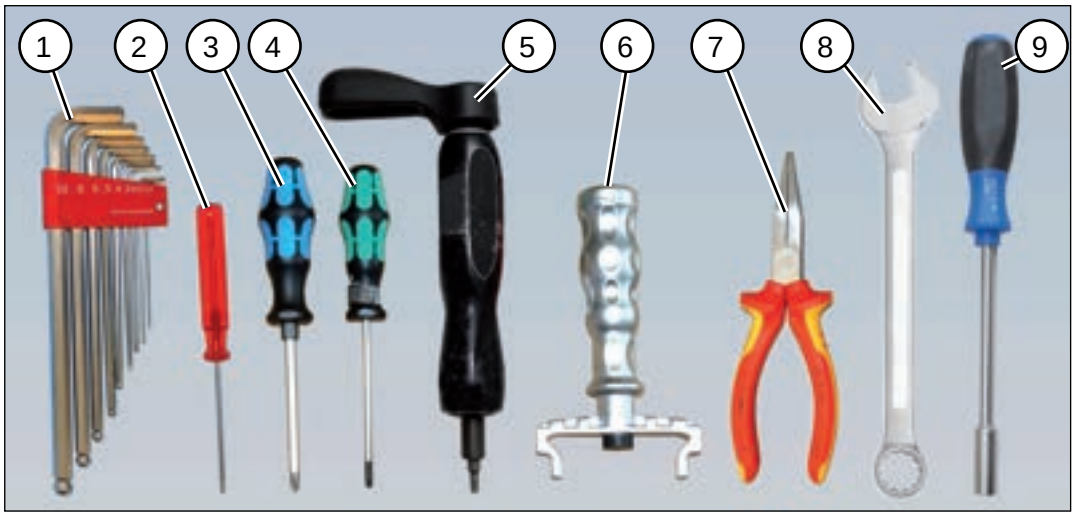
Maintenance set accessory from VACUUBRAND



No.	Tool set for 8-cylinder NT pumps #20649918	Size
1	**Assembly stand 8Z NT**	---
2	**Hex key**	
	Loosen/secure transport lock	Size 5
	Loosen/secure pump foot	Size 5
	Loosen/secure head cover	Size 5
3	**Phillips screwdriver**	
	Fittings for suction/pressure distributor	PH2
4	**Torx screwdriver**	
	Loosen/secure clamping brackets	TX20
5	**Hose-clamp pliers**	
	Close hose clamps	180 mm
		
6	**Diaphragm wrench**	
	Replace the diaphragms	SW66

Tools for maintenance, additional

→ Example
Overview of required tools



No.	Tool set for 8-cylinder NT pumps #20649918	Size
1	**Hex key**	
	Loosen/secure transport lock	Size 5
	Loosen/secure pump foot	Size 5
	Loosen/secure head cover	Size 5
	Loosen/secure air inlet	Size 2.5
2	**Flat-head screwdriver**	
	Open hose clamps	Size 1
3	**Phillips screwdriver**	
	Fittings for suction/pressure distributor	PH2
4	**Torx screwdriver**	
	Loosen/secure clamping brackets	TX20
5	***Torque wrench, adjustable 2–10 Nm**	
6	**Diaphragm wrench #20636554**	
	Replace the diaphragms	SW66
7	**Flat nose pliers**	
	Close hose clamps	
8	**Open-end wrench**	
	Counter transport eye fastening	SW10
9	Socket wrench	
	Replace fan fabric	Size 7

** In the example here with bit support*

Spare parts for one pump module

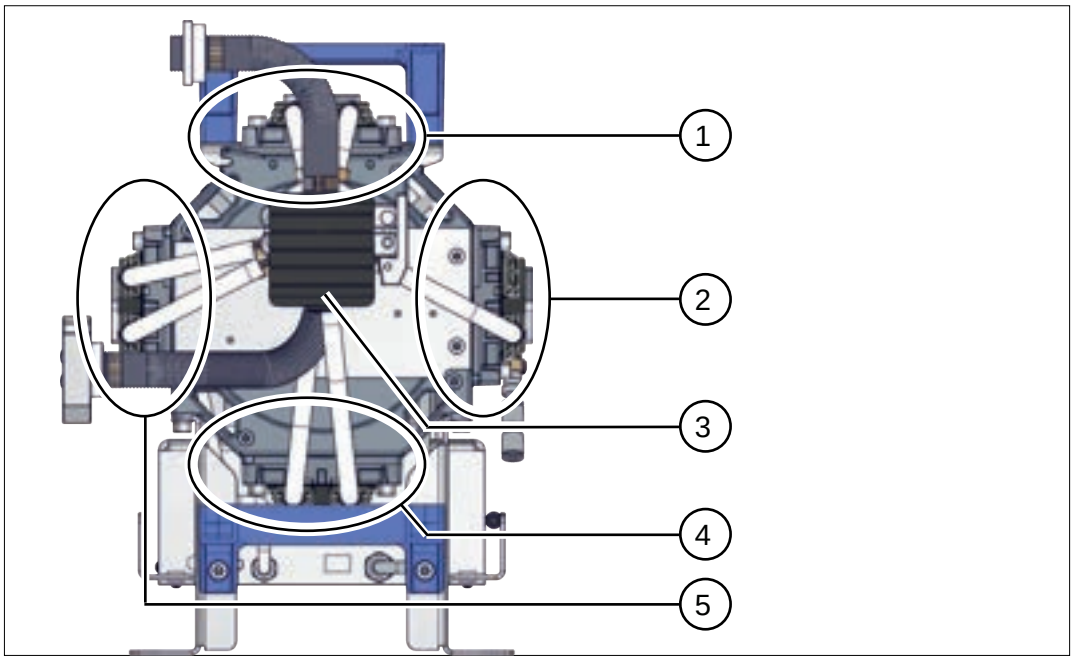
Maintenance set #20696881 contains all the spare parts you need for the maintenance of the two vacuum pumps from one pump module.

⇨ Please order the maintenance set before you start with service work.

5.3.2 Servicing a vacuum pump (diaphragm + valves)

Items that require maintenance

→ Example
Front view of vacuum pump



Maintenance items	
1	Top pump head pair
2	Pump head pair right
3	Suction/pressure distributor *(behind outlet condenser OC)*
4	Bottom pump head pair
5	Left pump head pair

IMPORTANT!

⇨ Service the 4 pump head pairs one after the other.

⇨ Change all diaphragms and valves on the 4 pump head pairs as described below in the image description for the pump pair above (1).

Straightforward maintenance due to split work steps.

⇨ On one pump head pair, first replace the diaphragms.

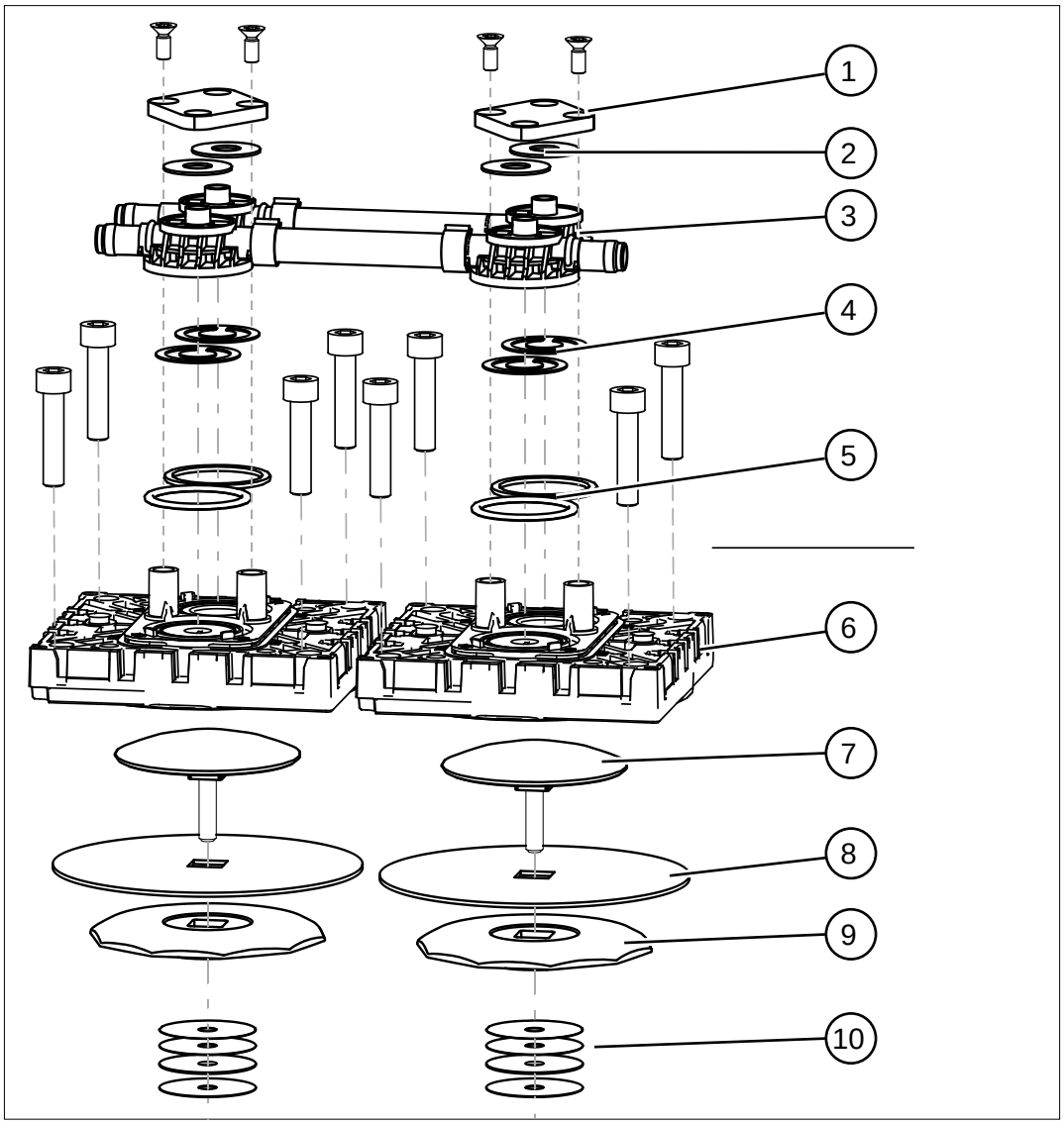
⇨ Then change the O-rings and inlet/outlet valves of the valve terminals.

⇨ Afterwards, replace the O-ring and pressure relief valve in the suction/pressure distributor.

⇨ Repeat these steps on the next pump head pair.

Eexploded drawing of pump head pair (No. 1/2/3/5 on *Page 28*)

→ Example
Pump head pair of vacuum pump



Valve maintenance		in the maintenance set
1	Clamping bracket + screw fittings	
2	Disc springs	
3	Valve terminals	
4	Valves	x
5	O-rings 26 x 2	x

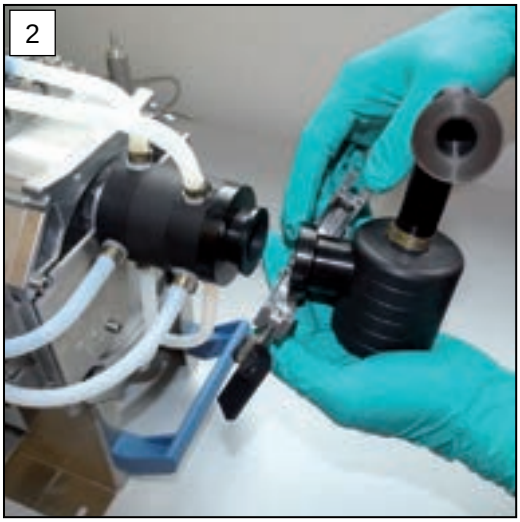
Diaphragm maintenance		in the maintenance set
6	Head cover + screw fittings	
7	Diaphragm clamping disc with square-head screw	
8	Diaphragm	x
9	Diaphragm support disc	
10	Spacer discs, max. 4	

Maintenance set VAC 24seven for one pump module	20696881

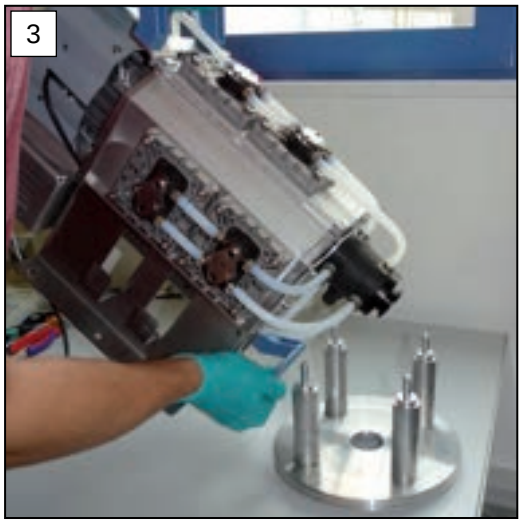
Replace the diaphragms

→ Example
Diaphragm replacement with assembly stand from tool set #20649918

1. Open the clamping ring of the outlet condenser (OC).

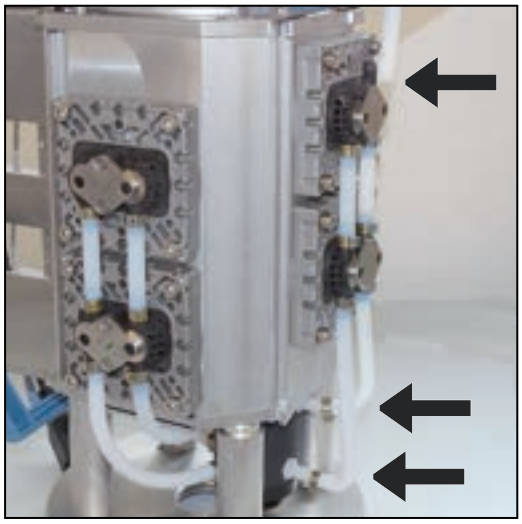


2. Remove the outlet condenser and put aside the outlet condenser, clamping ring, and centering ring.



3. Place the vacuum pump in the assembly stand (included in the tool set).

View: Vacuum pump placed vertically in assembly stand.

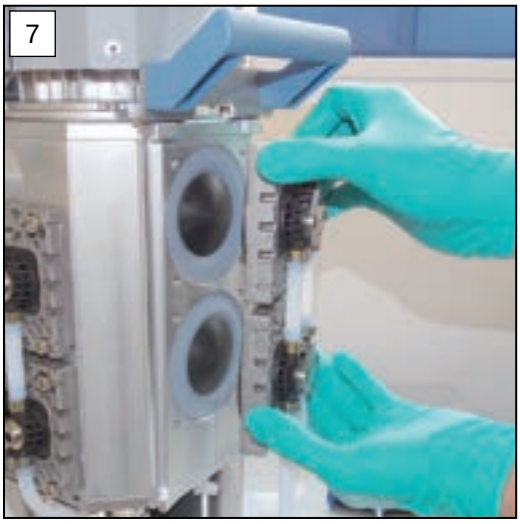


Side view:
Molded hoses of pump head pair.

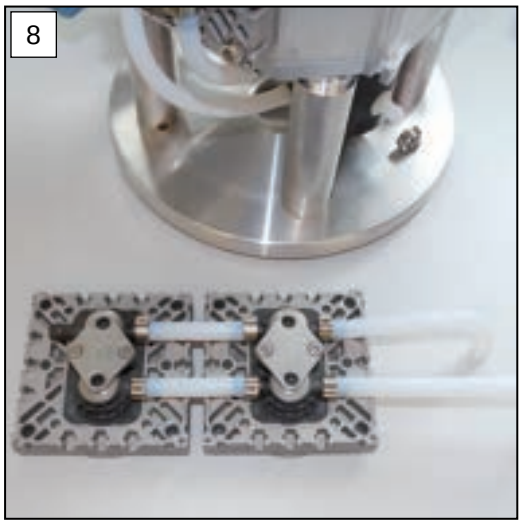
4. Open the hose clamps of the hoses of a pump head pair. Flat-head screwdriver size 1.

5. Pull the molded hoses off the hose nozzles.

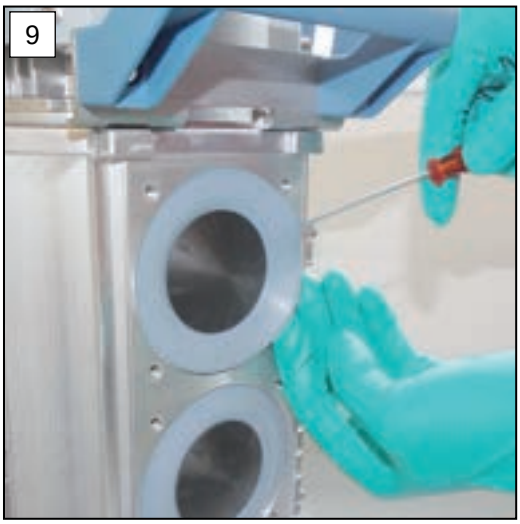
6. Unscrew the socket head screws from the head covers. Hex key size 5.



7. Lift the pump head pair along with all the screw fittings of the vacuum pump.



8. Set the pump head pair aside.



9. Carefully lift the diaphragm using an aid, e.g., a sturdy plastic rod or flat-head screwdriver.

IMPORTANT!

⇨ Do not damage the aluminum housing.

10. Fold the diaphragm forward at the sides and carefully place the diaphragm wrench on the diaphragm support disc.

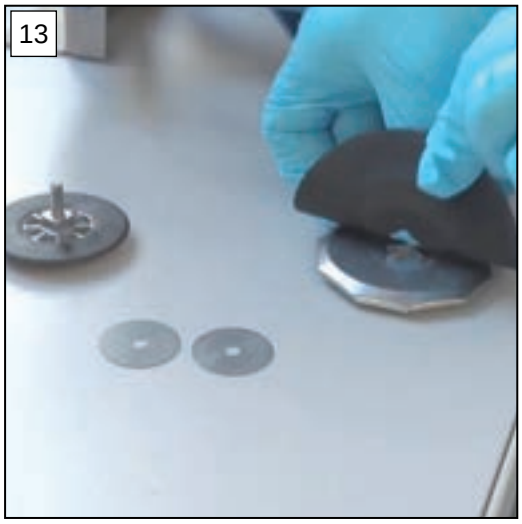
11. Use the fixed diaphragm wrench to screw out the assembly.

12. Lift the diaphragm along with all the parts out of the vacuum pump. If the spacer discs adhere to the connecting rod, remove them carefully.

IMPORTANT!

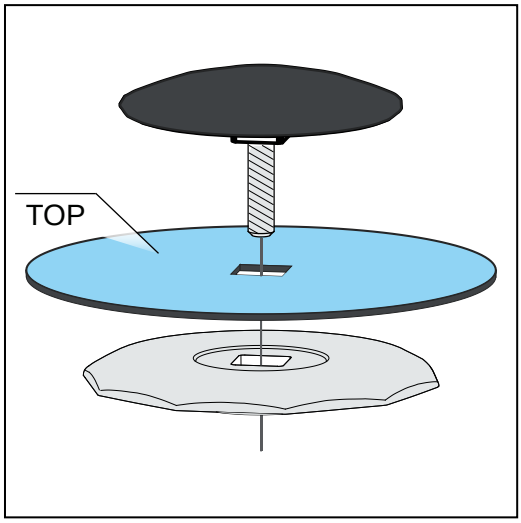
⇨ Never drop spacer discs into the aluminum housing.

⇨ Keep the spacer discs. It is essential to reinsert the same number of spacer discs.



13. Pull out the diaphragm clamping disc and remove the used diaphragm.

14. Place the new diaphragm over the square head of the clamping disc.



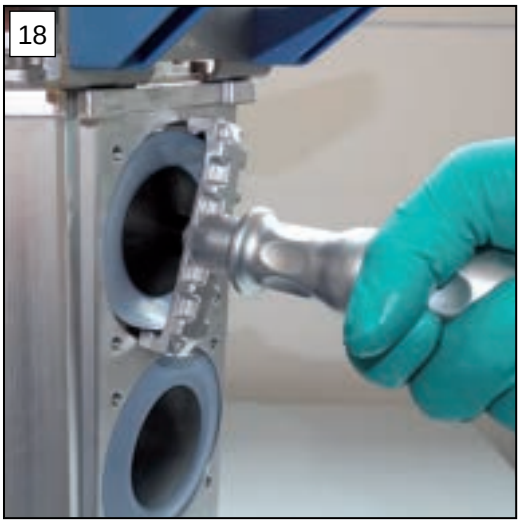
IMPORTANT!

- ⇨ Ensure that the diaphragm is inserted correctly, with the coated, light-colored side facing upwards.
- ⇨ Pay special attention to correct positioning on the square head.

15. Place all spacer discs on the thread pin.

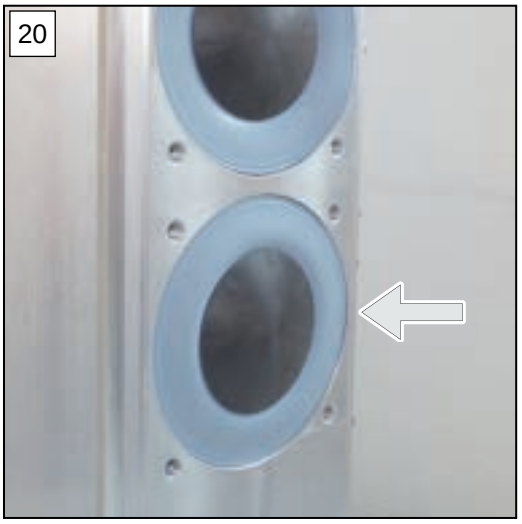
16. Secure the diaphragm assembly inside the diaphragm wrench.

17. Hold the spacer discs firmly and place all the components carefully on the connecting rod thread.



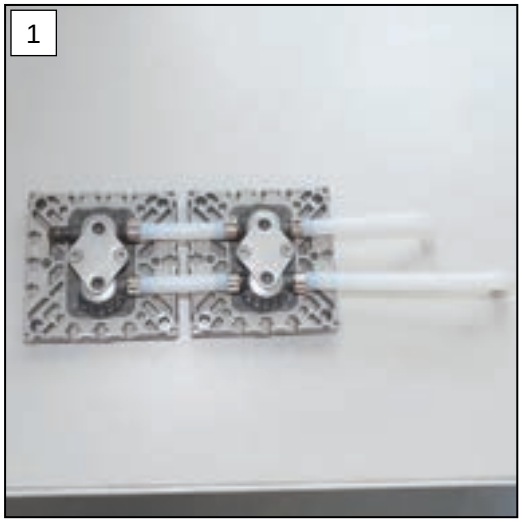
18. Initially tighten the assembly with the diaphragm wrench by hand.

19. Then position a torque wrench with socket head bit on the diaphragm wrench and tighten the assembly to 6 Nm.



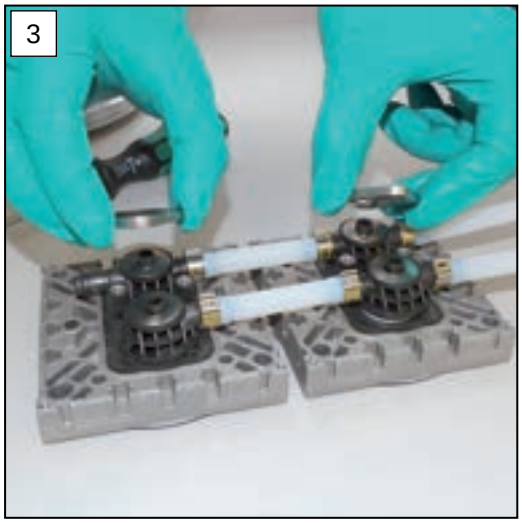
20. Repeat the steps for the second diaphragm.

Replace the valves

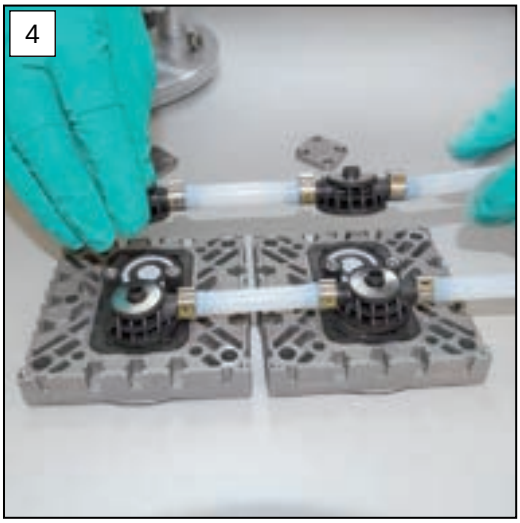


1. Take the pump head pair which you had set aside and

2. unscrew the Torx screws. Torx screwdriver Tx20

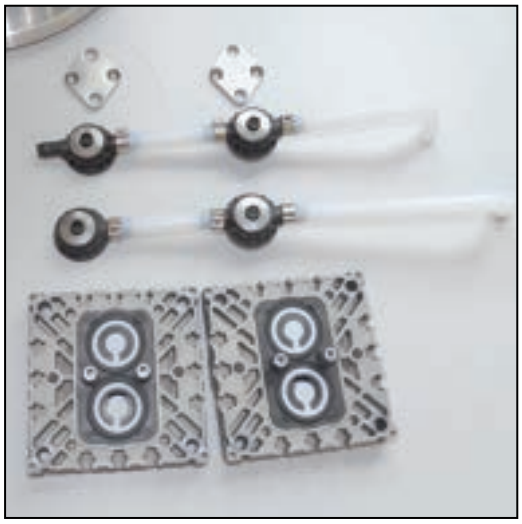


3. Remove the clamping brackets from the valve terminals.

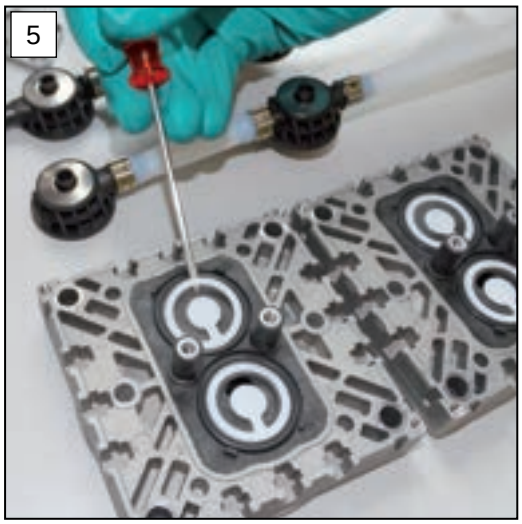


4. Lift both valve terminals from the pump head and set them aside.

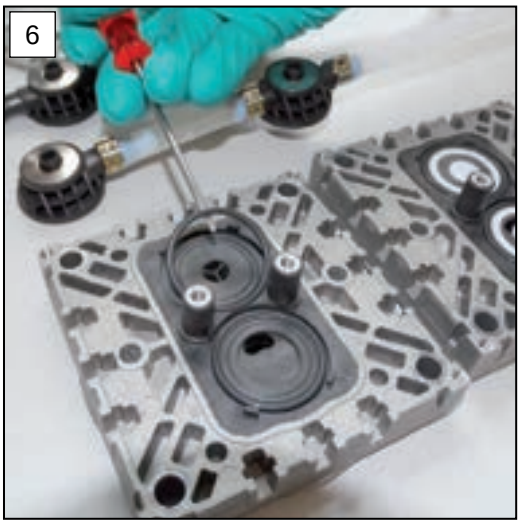
NOTICE
Valves can adhere to the underside of a valve terminal.



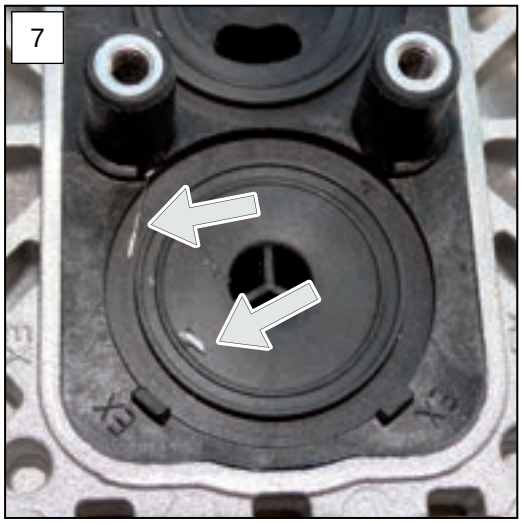
Top view:
Valve terminals, valves and pump head pair.



5. Carefully remove the used valves, e.g., with a sturdy plastic rod or a narrow flat-head screwdriver.



6. Carefully remove the used O-rings.

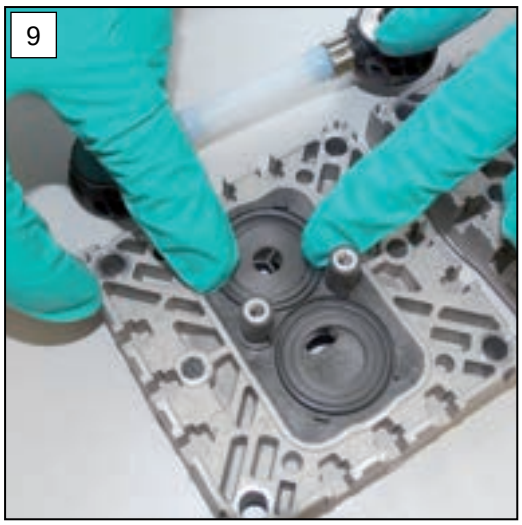


7. Check the surfaces for dirt.

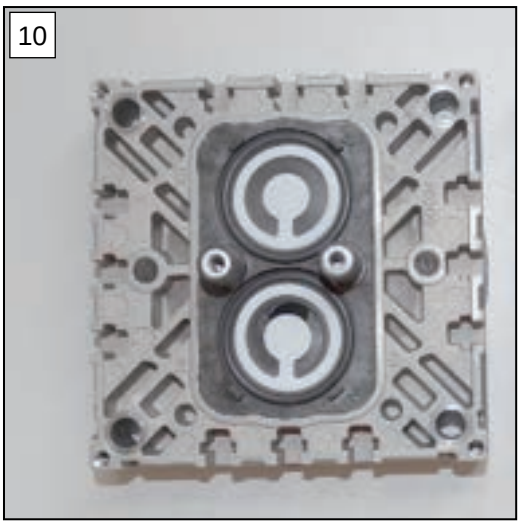
8. Clean dirty surfaces carefully.

IMPORTANT!

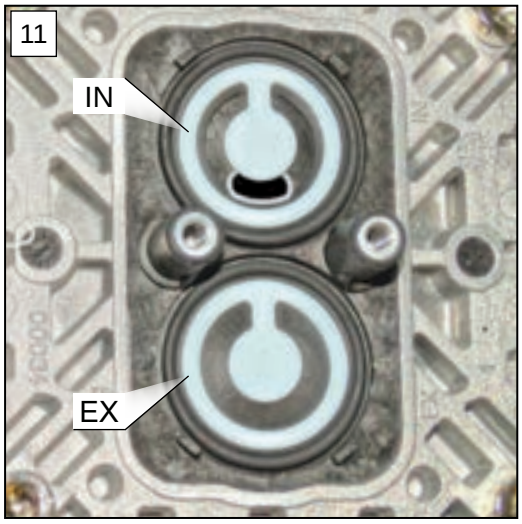
⇨ No particles or dirt may get inside the vacuum pump.



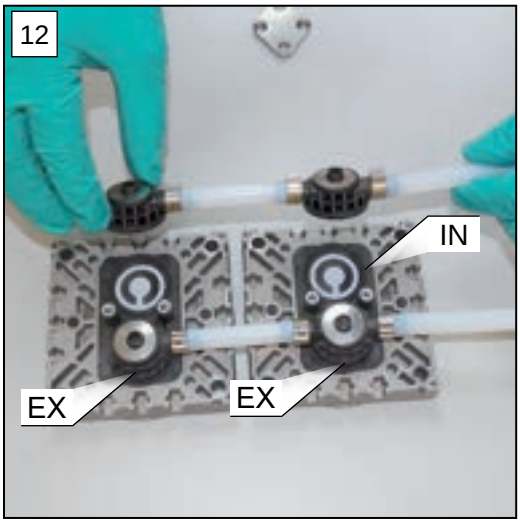
9. Insert the new sealing rings into the grooves.



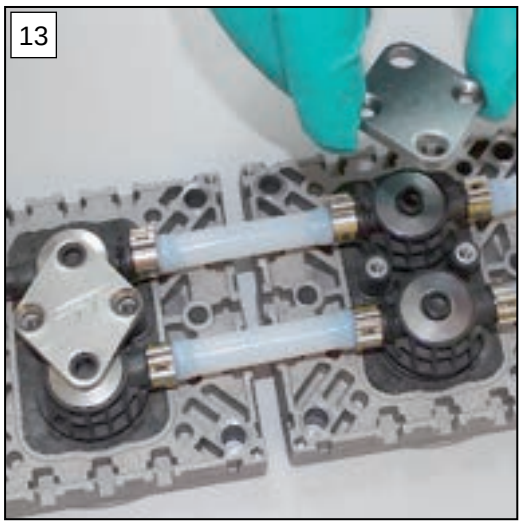
10. Place the new valves on top and align them.



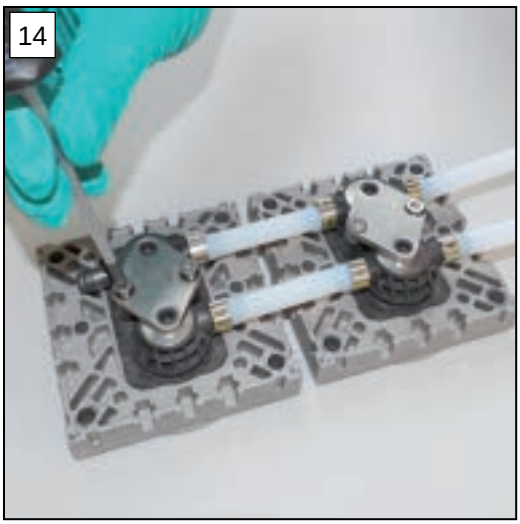
11. Compare the valve positions with this illustration.
IN = Inlet (inlet)
EX = Exhaust (outlet)



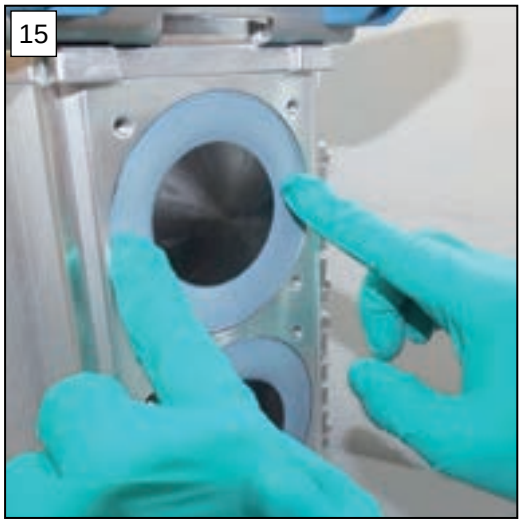
12. Place the two valve terminals on the pump heads again. Here as well, compare the correct position of IN and EX with the labeling on the valve terminals.



13. Place the clamping brackets on the valve terminals with the disc springs.



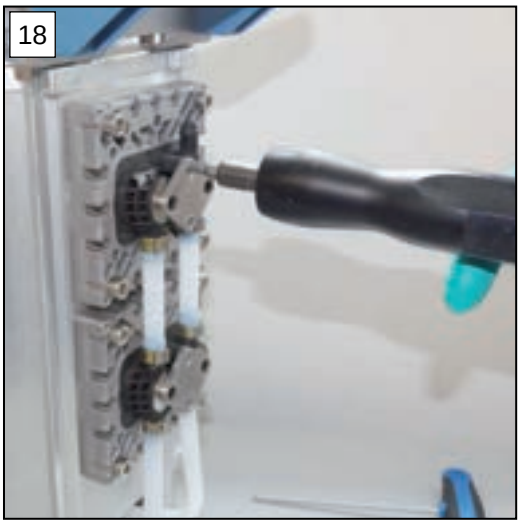
14. First hand-tighten the screw fittings.



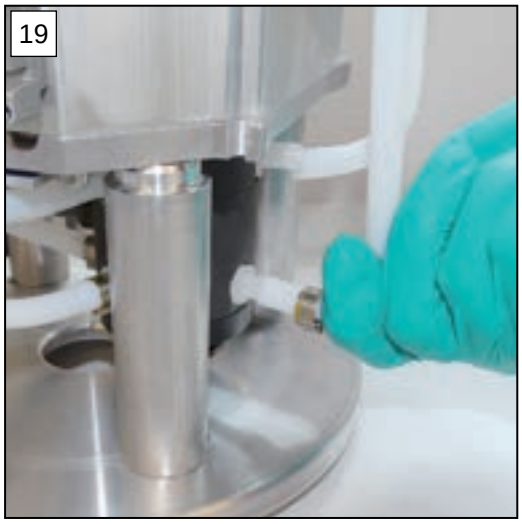
15. Carefully press the diaphragms centrally into the housing opening, ensuring they are flush with it.

16. Hold the pump head pair at the vacuum pump and wind in the screw fittings.

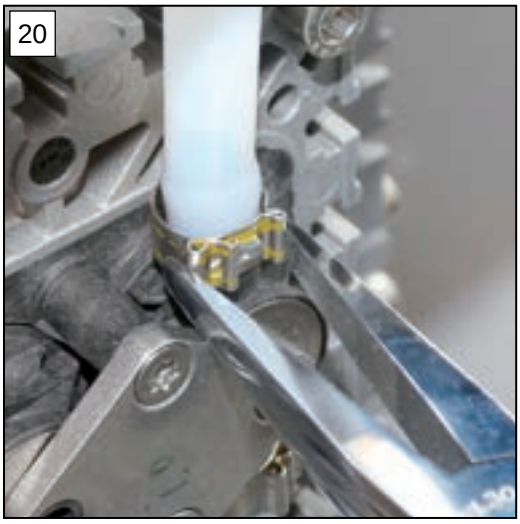
17. Tighten the screw fittings crosswise with a torque wrench of 6 Nm.



18. Tighten the screw fittings of the clamping brackets with a torque wrench of 3 Nm.



19. Slide the molded hoses back onto the hose nozzles.



20. Secure the hose clips on the hose nozzles, e.g., with flat nose pliers.

NOTE

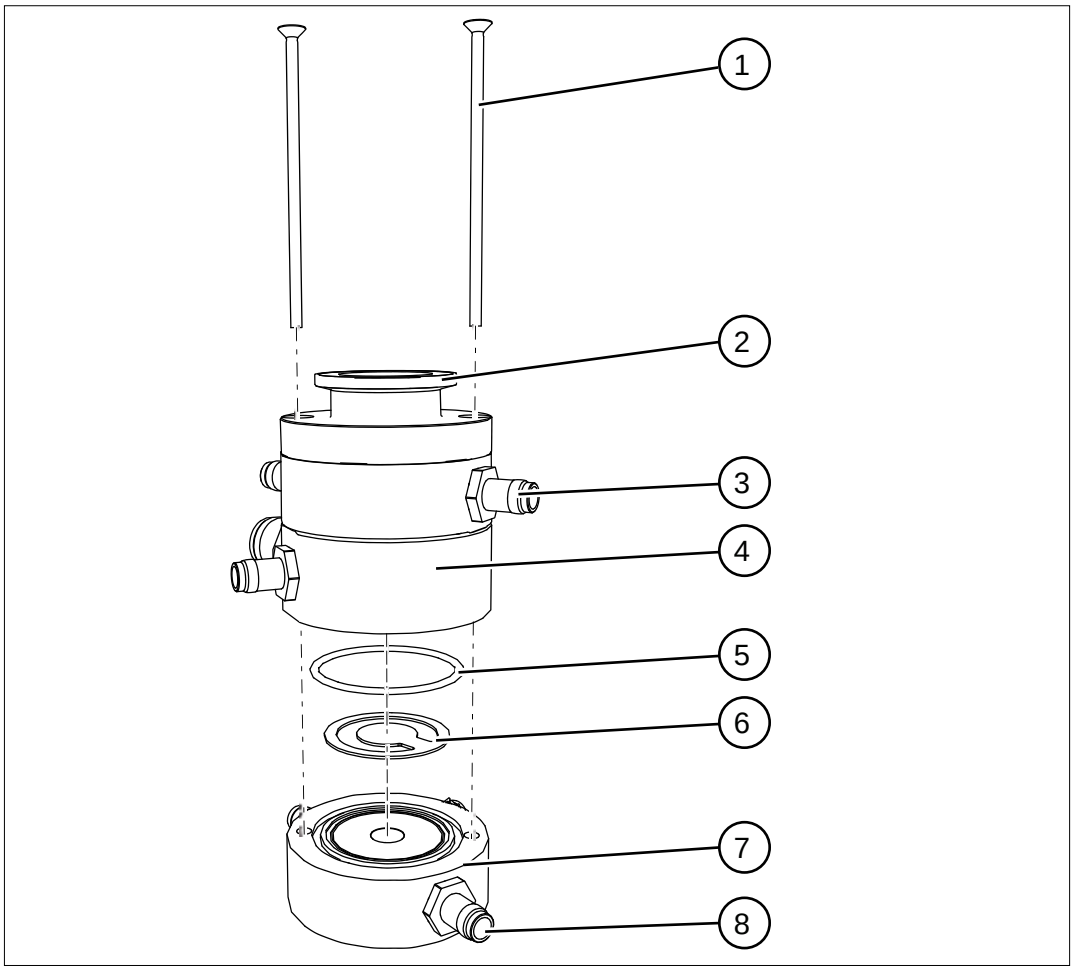
Always maintain the diaphragm and inlet/outlet valves of a vacuum pump completely.

⇨ Service all pump heads as described in the chapters ***Replace the diaphragms on page 30*** and ***Replace the valves on page 37***.

5.3.3 Suction/pressure distributor maintenance

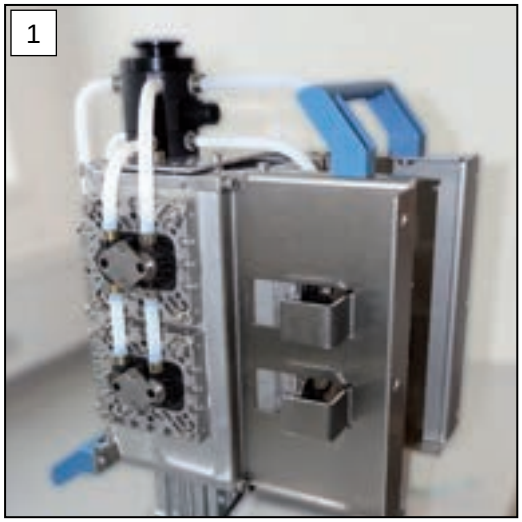
Exploded drawing of suction/pressure distributor (No. 4 on *Page 28*)

→ Example
Suction/pressure distributor
Vacuum pump

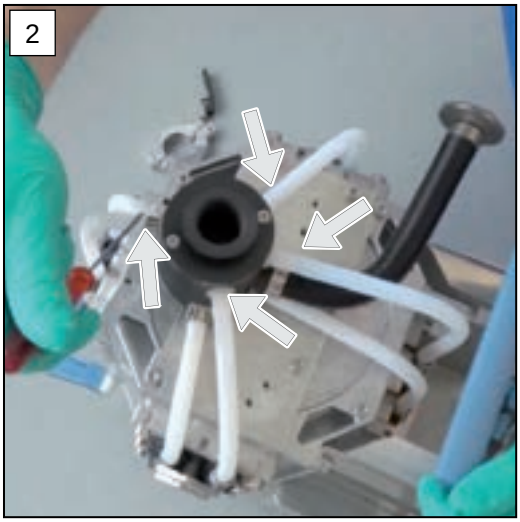


Maintenance overpressure relief valve + O-ring	
1	Countersunk screw M4x80
2	Connection DN 25
3	Hose nozzle
4	Suction distributor
5	O-ring 40 x 2
6	Pressure relief valve D37
7	Pressure distributor
8	Hose nozzle

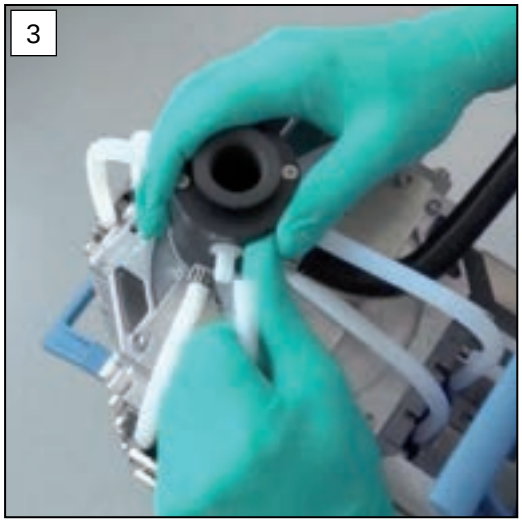
Replace pressure relief valve + O-ring



1. Place the vacuum pump on a clean, stable surface as shown. Stabilize the vacuum pump so that it cannot tip over.



2. Open the 4 small upper hose clamps, see arrow markings. Flat-head screwdriver size 1.

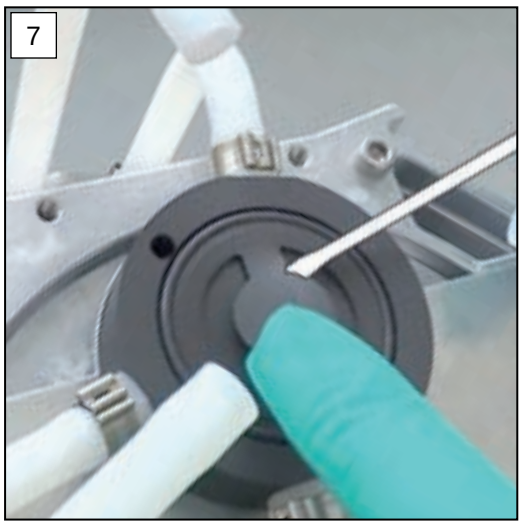


3. Remove the molded hoses one by one from the hose nozzles.

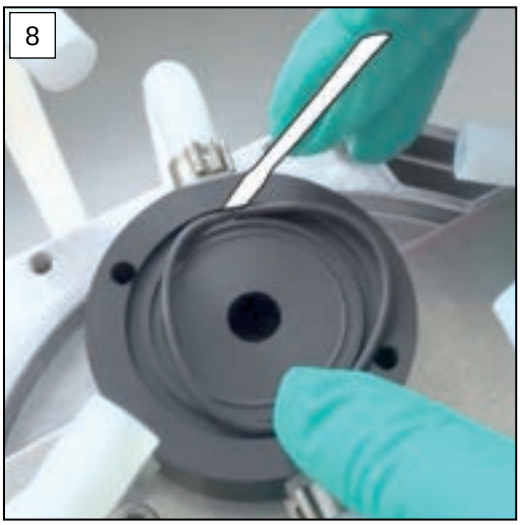
4. Unscrew the screw fittings. PH2 Phillips screwdriver.

5. Pull the screws out of the pressure distributor.

6. Remove the suction distributor and set it aside.

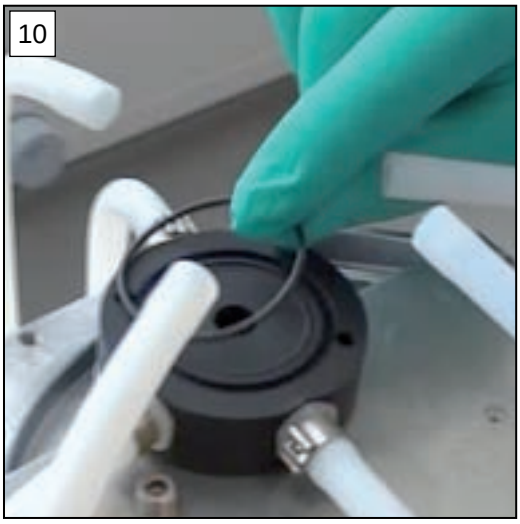


7. Carefully remove the used pressure relief valve, e.g., with a sturdy plastic rod or a narrow flat-head screwdriver.

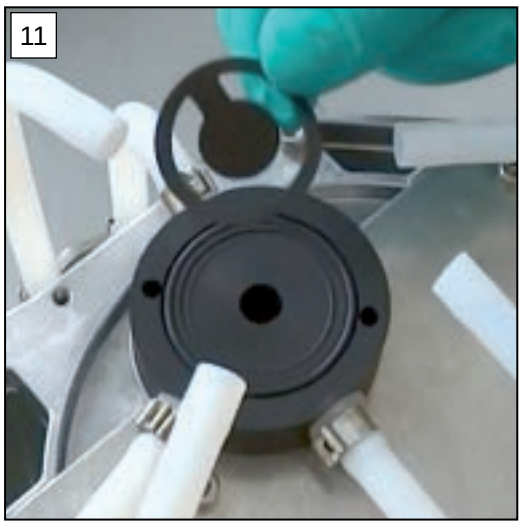


8. Carefully remove the used O-ring.

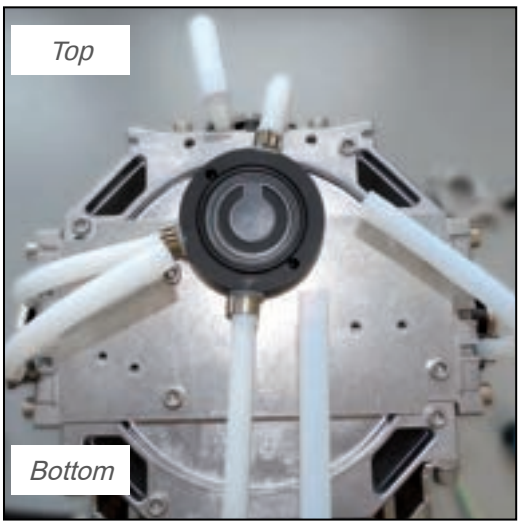
9. Clean the surface if dirty.



10. Place the new O-ring in the groove and press it down slightly.

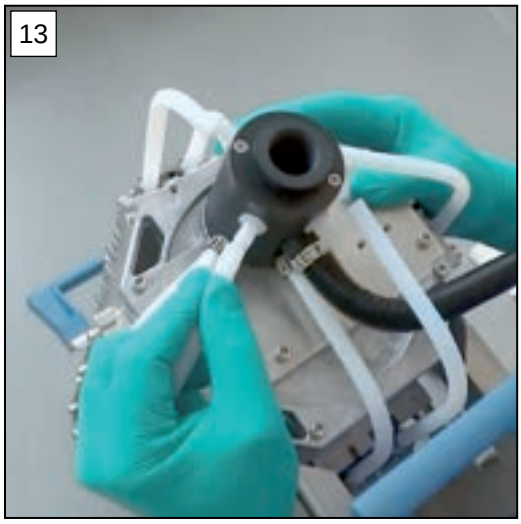


11. Place the new pressure relief valve on the clean surface.



Top view:
Correct positioning of pressure relief valve on pressure distributor.

12. Position the suction distributor with the screw fittings and hand-tighten the screw fittings. PH2 Phillips screwdriver.



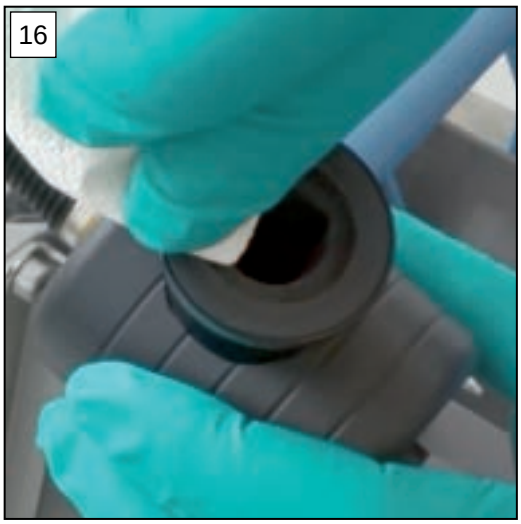
13. Push the molded hoses back into place on the hose nozzles.

During maintenance work, you can clean the molded hoses (PTFE/ white).

- ⇨ Only ever pull off only one molded hose, as they are always cut to a matching length.
- ⇨ Clean one molded hose with water, acetone, or a pipe cleaner.
- ⇨ Replace the molded hose on the corresponding hose nozzles.
- ⇨ Replace any defective molded hoses.

14. Slide the hose clamps onto the hose nozzle and close them with the flat nose pliers.

15. Clean the centering ring on both sides.



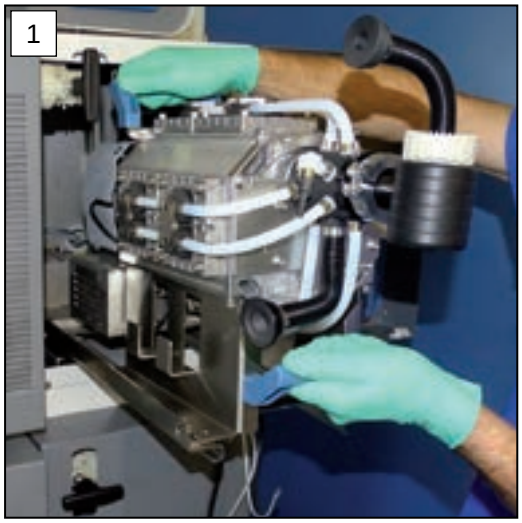
16. Clean the flanges from the outlet condenser and the suction/pressure distributor.

17. Place the centering ring between the flanges and fasten the outlet condenser to the suction/pressure distributor with the clamping ring.

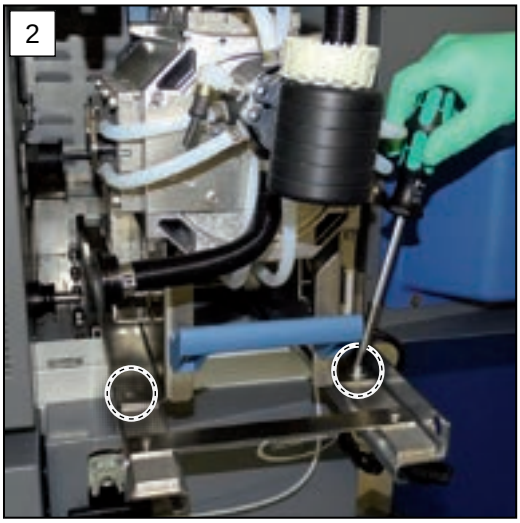
Use a test kit #20649915 to check the function and performance of the vacuum pump prior to reinstallation.

5.3.4 Reinsert the vacuum pump

Once all maintenance work, such as the replacement of diaphragms, valves, and O-rings, has been completed, the vacuum pump can be reinserted in the pump module.

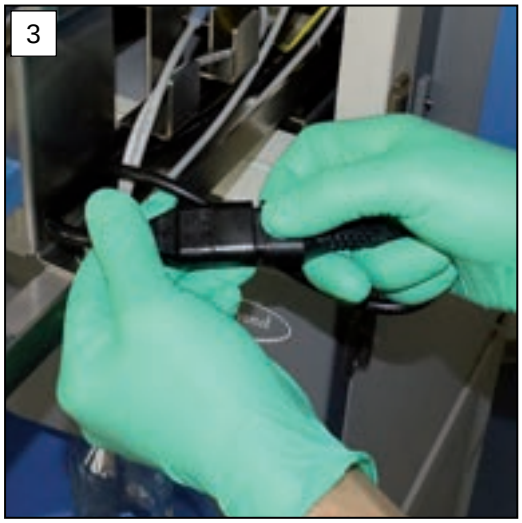


1. Pull out the sliding guides up to the stop and place the vacuum pump on top of it.

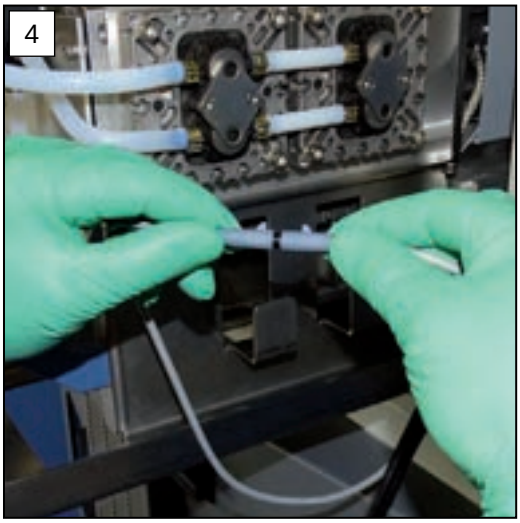


2. Place the vacuum pump with the holes over the threads and fix the vacuum pump with the hexagon socket screws. Hex key size 5.

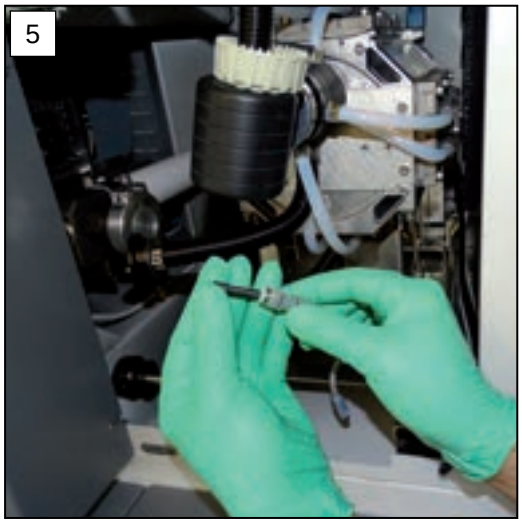
☑ Vacuum pump fixed.



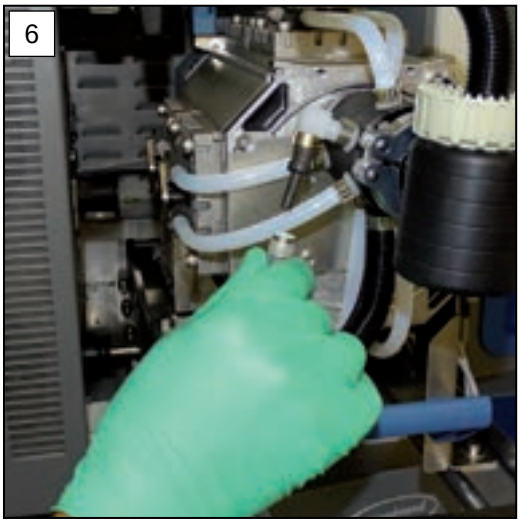
3. Connect the mains plug (= cold-device plug).



4. Connect the VACUU BUS plug.



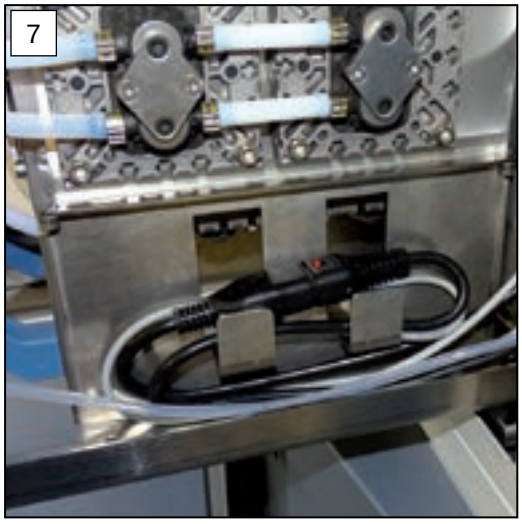
5. Push back the metal ring of the plug coupling and pull out the blanking plug.



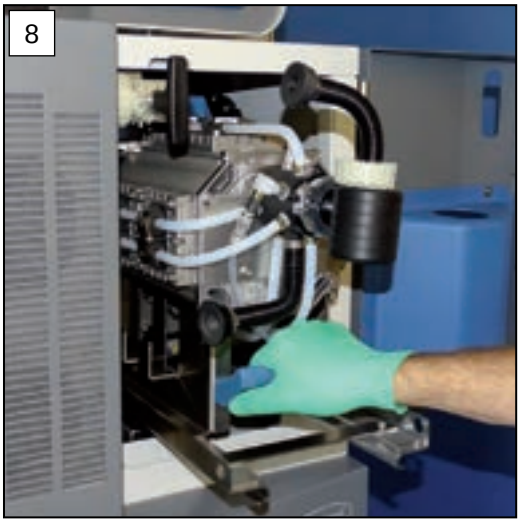
6. Slide the gas ballast hose into the plug coupling at the vacuum pump and test the hose locking with a gentle jerk.

IMPORTANT!

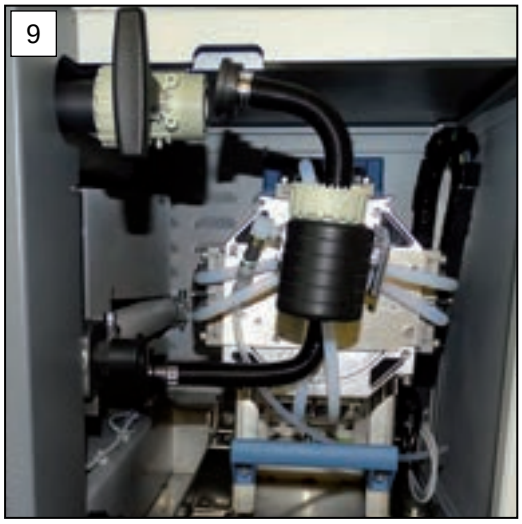
⇨ Keep the plug coupling and dummy plugs for servicing other vacuum pumps.

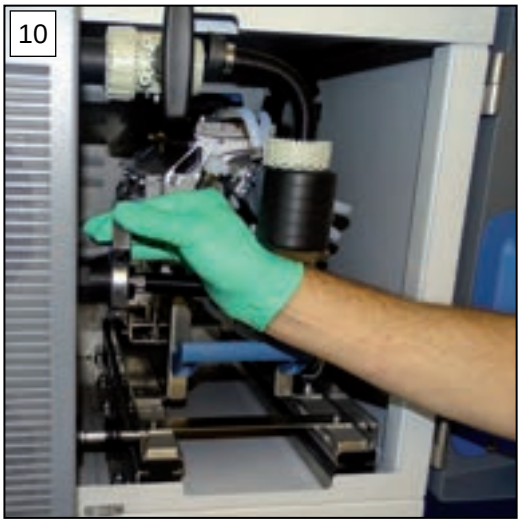


7. Stow the cable, plug, and gas ballast hose neatly in the brackets on the pump support.



8. Slide the vacuum pump back into the pump module housing.



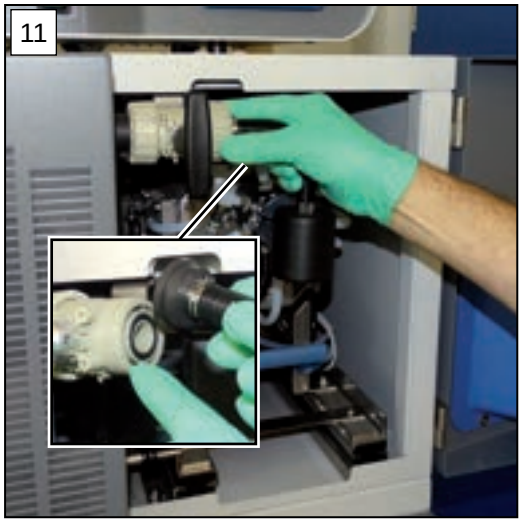


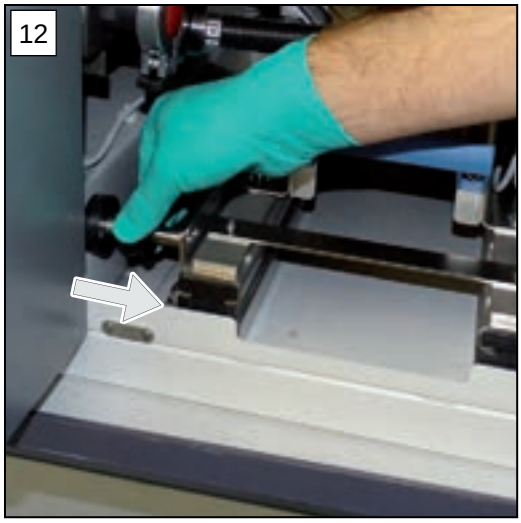
9. Push the vacuum pump inside until the suction- and exhaust pipe are placed directly in front of its connection.

NOTICE!

⇨ Switch off the parallel vacuum pump as long as the exhaust gas line is open.

10. Remove the blanking plug from the outlet pipe and reconnect the hose from the vacuum pump.





11. Re-connect the inlet pipe above.

12. Push the transport lock into the sliding guide.

13. Close the maintenance door.

14. Screw in the condensate catch pot.

15. Switch on the vacuum pump at rocker switch.

- ☑ Vacuum pump(s) in operation.
- ☑ Status LED turns **GREEN**.

16. Turn the black handle of the isolation valve 90° in either direction.

- ☑ Handle in horizontal position.
- ☑ Suction line opened.

5.3.5 Clean air inlet

Depending on the operating conditions, particles, dust, or similar matter may adhere to the air inlet of the pump module. We recommend checking the air inlet at weekly or monthly intervals, taking into account the operating conditions, and cleaning the fan fabric if dirty.

⇨ Place an industrial vacuum cleaner at the slots of the air inlet and carefully vacuum off adhering particles, dust, or lint.

5.3.6 Replace fan fabric

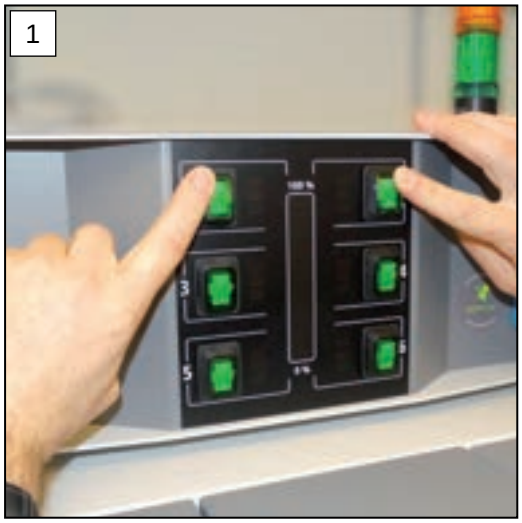
WARNING

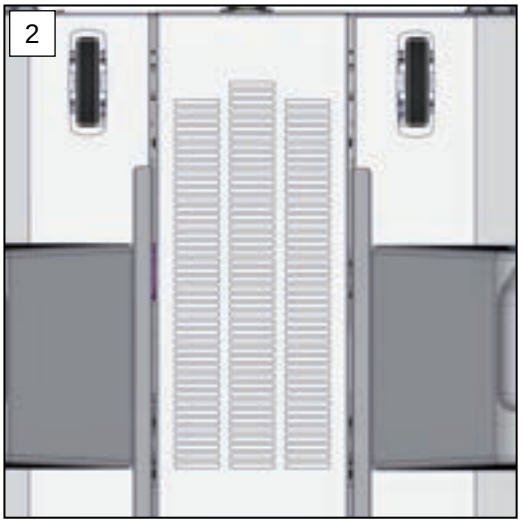
Risk of injury from rotating fans.

When the vacuum pumps are switched on, the cooling fans run automatically. If the air inlet is removed, the fan blades no longer have a cover.

⇨ Switch off the two vacuum pumps of the pump module before removing the air inlet.

⇨ Do **not** switch on the vacuum pumps as long as the air inlet is missing.





1. Switch off the two vacuum pumps of the pump module.

☑ Vacuum pumps stopped.

☑ Status LED turns **YELLOW**.

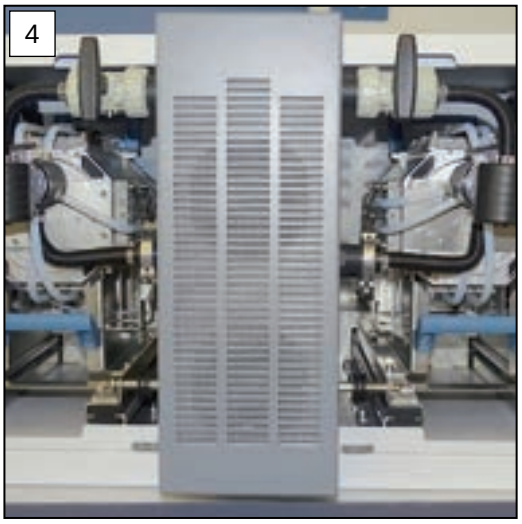
2. Turn the black handles of the isolation valves by 90° in either direction.

☑ Handles in vertical position.

☑ Suction line closed.

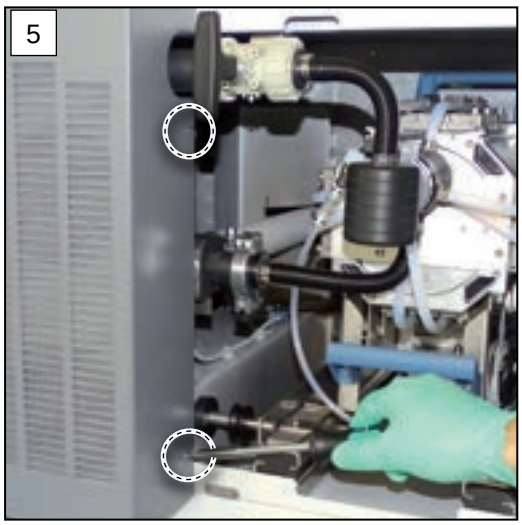
NOTICE
As long as the vacuum pumps are switched off, the fans will not run.

3. Screw out both condensate catch pots.

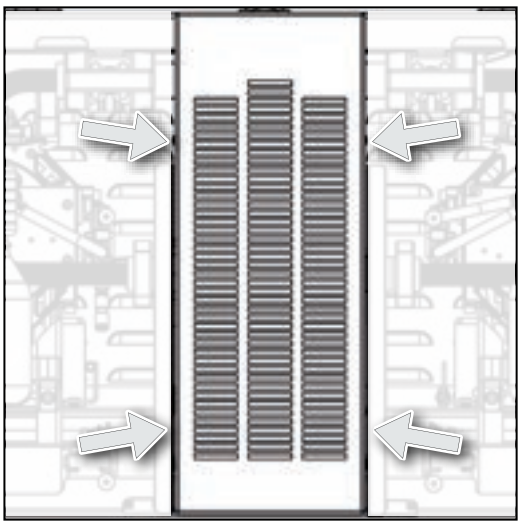


4. Open the maintenance doors.

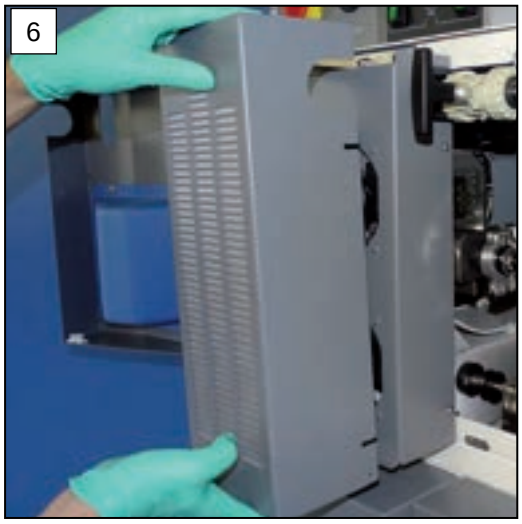
☑ Screw fittings of the air inlet freely accessible.



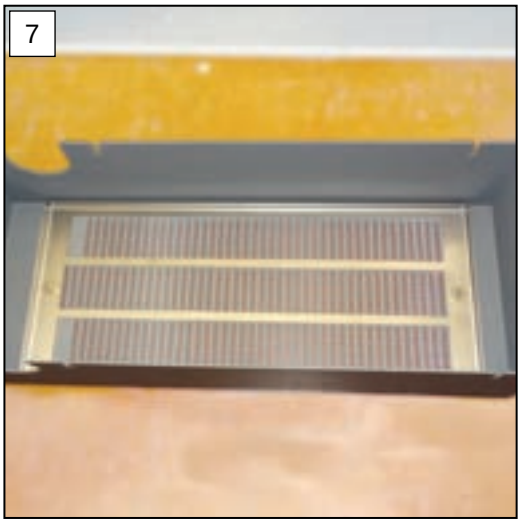
5. Unscrew the screw fittings of the air inlet halfway.



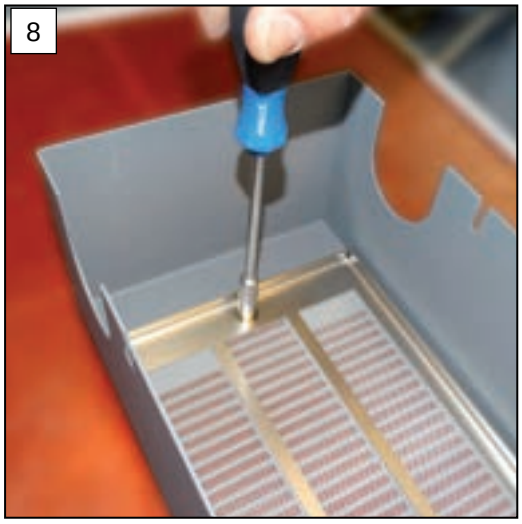
Front view:
Positions of the fastening screws.



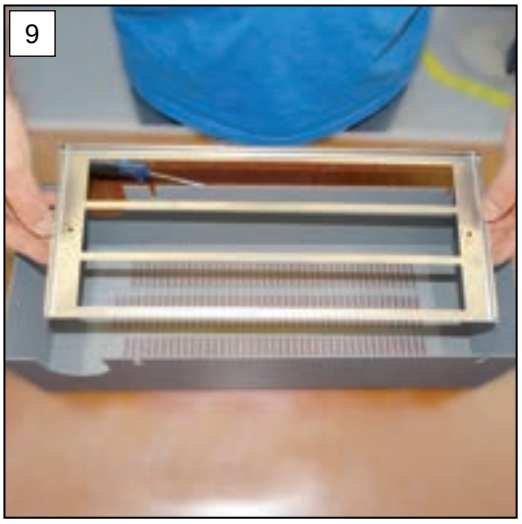
6. Remove the air inlet.



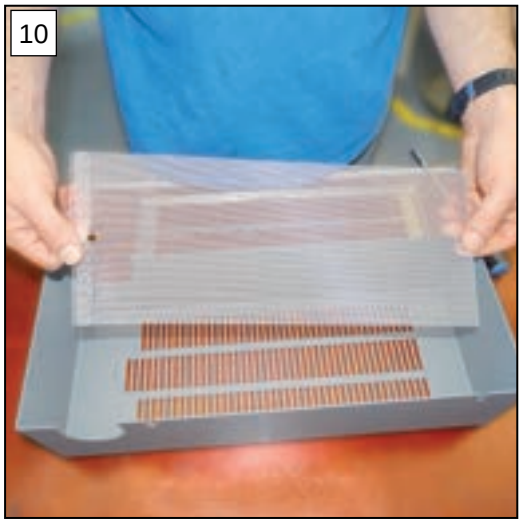
7. Place the air inlet on a clean work surface.



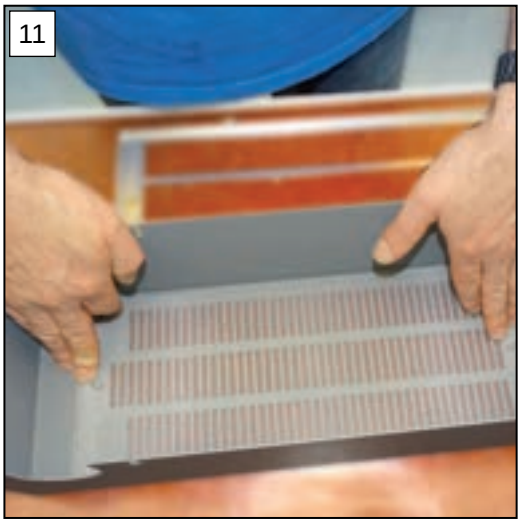
8. Unscrew the hexagon nuts on the filter clamping plate.



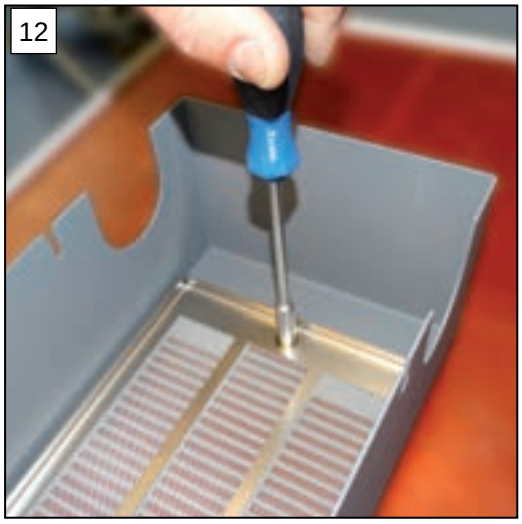
9. Lift the filter clamping plate out of the air inlet.



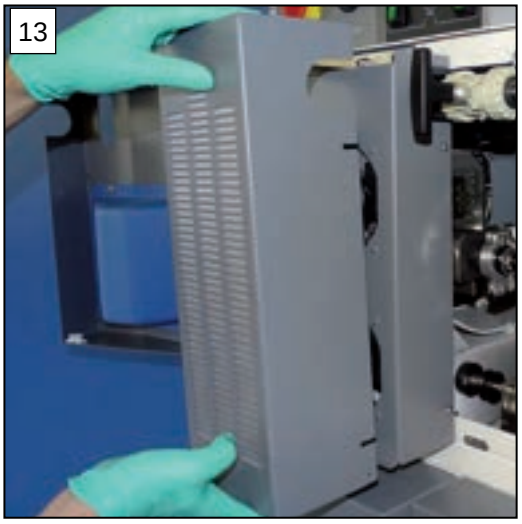
10. Remove the fan fabric.



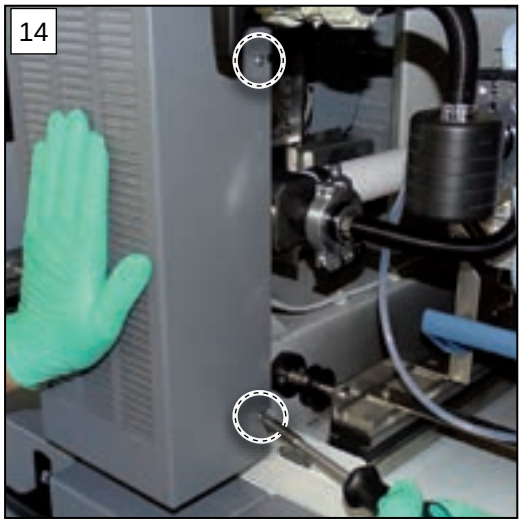
11. Place the new fan fabric in the air inlet.



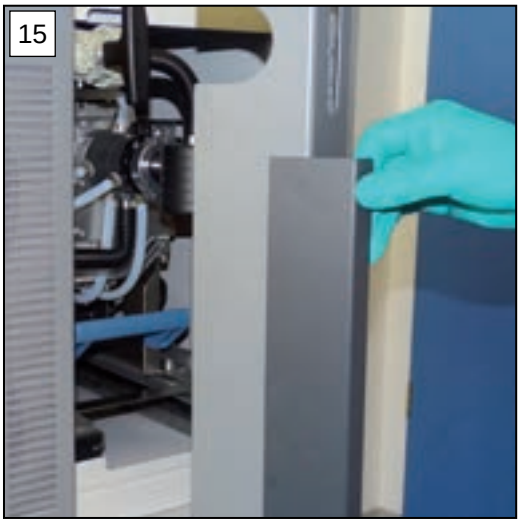
12. Tighten the hexagon nuts of the filter clamping plate.



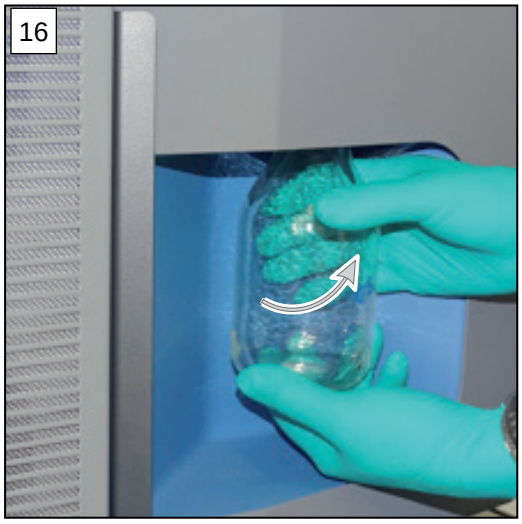
13. Slide the air inlet back onto the fans.



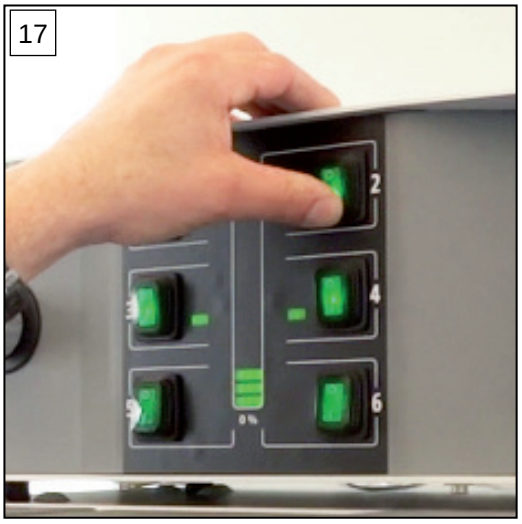
14. Hand-tighten all screw fittings of the fan inlet.



15. Close the maintenance doors.

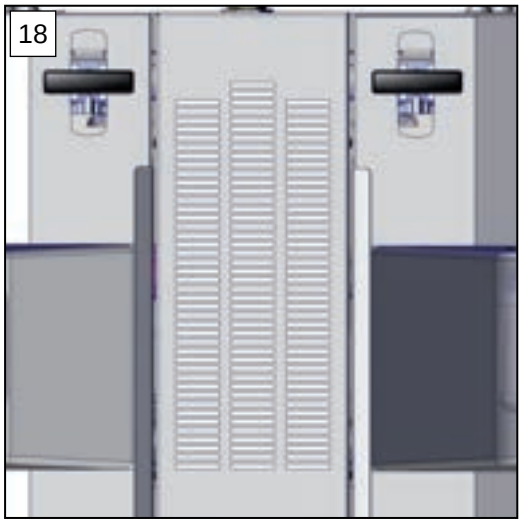


16. Screw the condensate catch pots into the pump module so they are hand-tight.



17. Switch the vacuum pumps on again.

- ☑ Fan fully activated for 10 sec.
- ☑ Vacuum pumps in operation.
- ☑ Status LED turns **GREEN**.



18. Turn the black handles of the isolation valve by 90° in either direction.

☑ Handles in horizontal position.

☑ In-line solenoid valves open.

19. Switch on the two vacuum pumps of the pump module.

☑ Vacuum pumps stopped.

☑ Status LED turns **GREEN**.

5.3.7 Empty the condensate catch pot

DANGER

Risk of explosion from sparks.

Emptying electrostatically charged glass containers may create sparks, which can ignite explosive mixtures of gases and vapors.

⇨ Wear your personal protection equipment when handling hazardous materials.

⇨ Empty collection bottles in a safe area.

⇨ Avoid friction on the outside of the condensate collection bottle to prevent static charging of the glass.

Condensate catch pots can be emptied at the same time the vacuum pump are serviced. If more liquid accumulates, it is necessary to check and empty the condensate catch pot more frequently, independently of maintenance intervals.

1. Use the rocker switch to switch off the vacuum pump for which you want to empty the condensate catch pot.

☑ Rocker switch light OFF.

☑ Status LED turns **YELLOW**.

2. Turn the black handle of the isolation valve 90° in either direction.

☑ Handle in vertical position.

☑ In-line solenoid valve closed.

3. Carefully unscrew the condensate catch pot from the thread.

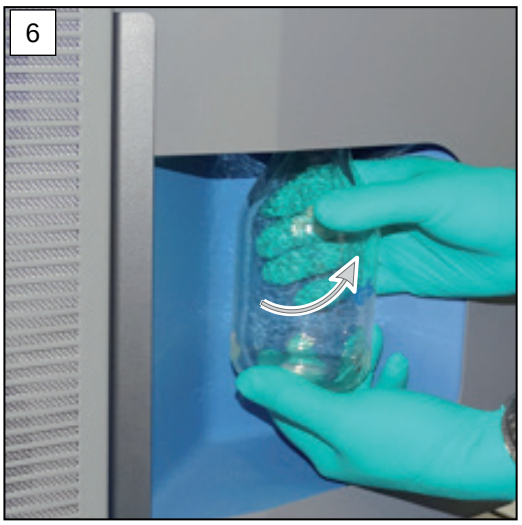
4. Remove the condensate catch pot from the pump module.

5. Empty the contents of the pot into a container.

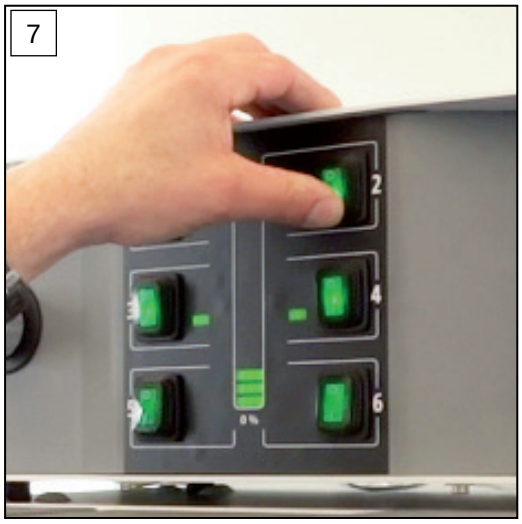
IMPORTANT!

⇨ Use a chemically resistant container for the condensate produced.

⇨ Hazardous substances must be disposed of separately in accordance with national regulations.



6. Screw the empty condensate catch pot into the pump module so it is hand-tight.



7. Switch on the vacuum pump at rocker switch.

- ☑ Vacuum pump in operation.
- ☑ Status LED turns GREEN.

8. Turn the black handle of the isolation valve 90° in either direction.

- ☑ Handle in horizontal position.
- ☑ Suction line opened.

6 Appendix

6.1 Technical information

6.1.1 Technical data

Technical data

Pump module VAC 24seven		(US)
Ambient temperature	10 – 45 °C	50 – 113 °F
Max. humidity	30 – 85 %	30 – 85 %
Protection class	IP42	
Weight, approx.		
Pump module (1x)	110 kg	242 lb
Pump module (2x)	220 kg	485 lb
Pump module (3x)	330 kg	727 lb
Floor loading (3 pump modules)	457 kg/m²	94 psf
Suction-side connection	KF DN 40	
Pressure-side connection (exhaust gas line)	KF DN 40	
Gas ballast connection	ID/OD 4/6 mm	
Protection class	IP42	
Pollution degree	2	
ATEX conformity, interior	II 3/- G Ex h IIC T3 Gc X Internal Atm. Only; Tech. File: VAC-EX02	

Pump module #70 mbar VAC 24seven		(US)
End vacuum, absolute	70 mbar	52.5 Torr
End vacuum with gas ballast, absolute	100 mbar	75 Torr
Pumping speed (1/2/3 pump modules)	40/80/120 m³/h	24/48/72 cfm

Pump module #5 mbar VAC 24seven		(US)
End vacuum, absolute	5 mbar	3.75 Torr
End vacuum with gas ballast, absolute	7 mbar	5.25 Torr
Pumping speed (1/2/3 pump modules)	30/60/90 m³/h	18/36/54 cfm

Motor data, individual		(US)
Motor nominal capacity	1 kW	1.34 hp
Rotational speed 100%	2400 min^{-1}	2400 rpm
Motor protection	Temperature sensor on circuit board (current limiter)	
Cooling type	Air	Air
Device fuse (failure protection)	10 A/t	10 A/t

Operating conditions

Operating conditions		(US)
Working temperature	10 – 45 °C	50 – 113 °F
Storage/transport temperature	-10 – 60 °C	14 – 140 °F

Gas temperature range

Maximum admissible media temperature non-explosive atmosphere:		
Short term	80 °C	176 °F
Continuous operation	10 – 45 °C	50 – 113 °F
Maximum admissible media temperature when pumping potentially explosive atmospheres:		
Short term	45 °C	113 °F
Continuous operation	10 – 45 °C	50 – 113 °F
ATEX conformity, inner area	II 3/- G IIC Ex h T3 Gc X Internal Atm. only; Tech. File: VAC-EX02	

Admissible pressure ranges

Max. admissible pressure		(US)
at the inlet (IN), absolute	1,1 bar	825 Torr
at the exhaust (EX), absolute	1,1 bar	825 Torr
Differential pressure between the inlet and outlet	1,1 bar	825 Torr
at gas ballast, absolute	1,2 bar	900 Torr

6.1.2 Wetted materials

Wetted pump module materials

Component	Wetted materials
Piping	SW: PTFE carbon fiber reinforced A: PTFE AS Ultra EX E: PP, carbon fiber reinforced
Head cover	ETFE carbon fiber reinforced
Diaphragm clamping disc	ETFE carbon fiber reinforced
Diaphragm	PTFE/FPM
Valves (inlet / outlet) ME 12C NT VARIO #5 mbar	PTFE
Pressure relief valve	FFKM
Valves (inlet / outlet) ME 16C NT VARIO #70 mbar	PTFE
O-ring	FPM
Valve terminal	ECTFE carbon fiber reinforced
Tubing	ID25 PTFE AS Ultra EX
Hose fittings	ETFE/ECTFE
Molded hose	PTFE
Gas ballast tube	PTFE carbon fiber reinforced
Inlet	PP glass fiber reinforced
Distributor, hose fitting to outlet	PTFE carbon fiber reinforced
Outlet, hose nozzle at outlet	PTFE + E-Kohle
Vapor condenser, round bottom flask	Borosilicate glass
Separator (OC)	PP glass fiber reinforced/PE

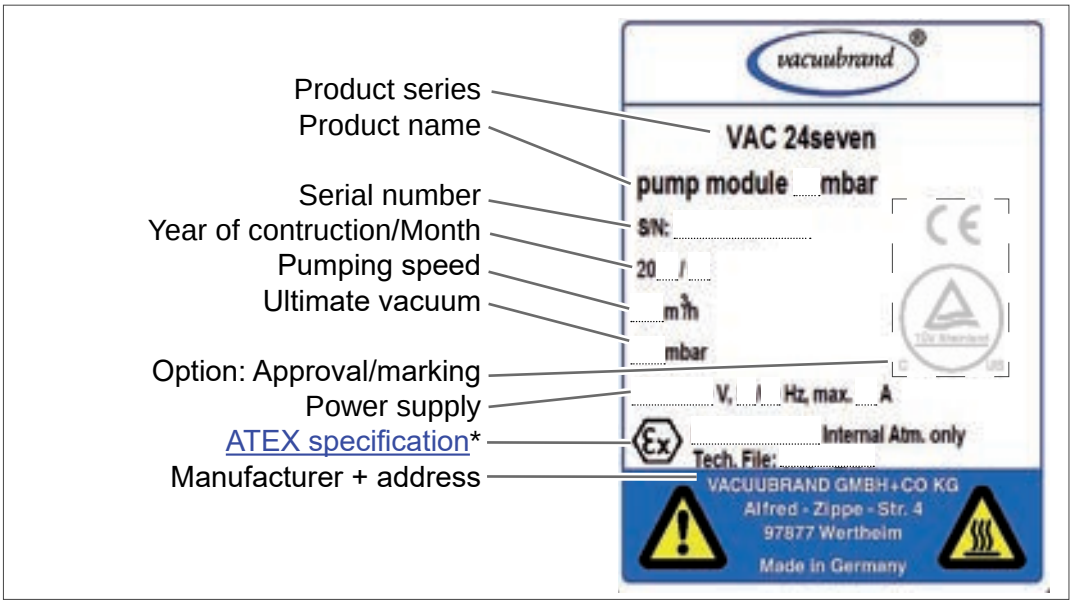
Sealing/centering ring at separator (OC)	FEP
Adapter KF 25 to hose nozzle 15 mm (OC)	PP

6.1.3 Rating plate

- ⇨ In the event of an error, make a note of the type and serial number on the rating plate.
- ⇨ When contacting our Service Department, please provide the type and serial number from the rating plate. This will allow us to provide you with specific support and advice for your device.

Pump module rating plate

Rating plate, general



** Indicating documentation, group and category, marking G (gas), type of protection, explosion group, temperature class (see also: Approval for ATEX equipment category).*

Ordering information (pump module)

This is an excerpt of the order data with common parts for a pump module of a **VAC 24seven**.

Pump module 5 mbar	20745318
Pump module 70 mbar	20745118

Ordering information spare parts

Spare parts for VAC 24seven	Order no.
Maintenance set VAC 24seven for one pump module	20696881
Separator OC for condensate, suction-side	20635437
Flask for separator OC, 500 ml, with thread GL 45	20635468
Door, left, for pump module, lacquered	20635472
Door, right, for pump module, lacquered	20635473
Hose, PAN, 6/4 mm (gas ballast)	23121392
Connection cable 230V	20635461
Chemistry diaphragm pump MD 12C NT VARIO ~5 mbar	20743715
Chemistry diaphragm pump MD 16C NT VARIO ~70 mbar	20741715
Basic pump 2 M2-8Z NT	20635552
Fuse 10 A AWG 18, blue (Motor 5x20 10 A/t)	20635507
Fuse 10 A AWG 18, black (Motor 5x20 10 A/t)	20635508
Fan motor	20612820
Fabric PP, 394 x 159, fan grille	20635336
Molded hose PTFE - available on request	---

Ordering information accessories

VAC 24seven accessories	Order no.
Machine feet set	20649913
Set for adjusting the lower pump outlet	20649912
Connection set for pump module	
Tool set for 8-cylinder NT pumps: ▸ Diaphragm wrench SW66 ▸ Torx screwdriver TX20 ▸ Phillips screwdriver PH2 ▸ Hexagon offset screwdriver SW5 ▸ Hose pliers for Clic clamp (hose clamp) ▸ Assembly stand 8Z NT	20649918
Test kit, CVC 3000 with connection parts to test individual pumps in case of service (after maintenance)	20649915
Transport eye set, with thread M 10	20649917
Collection container for condensate, 2 liter glass container incl. holder, for collecting condensate on the outlet side	20649916
Blanking plug-KPP_06 gas ballast	20638948

6.2 Index

6.3 Declaration of incorporation (EU)

Einbauerklärung für Maschinen
Declaration of Incorporation of the Machinery
Déclaration d'incorporation des machines

Hersteller / Manufacturer / Fabricant:

VACUUBRAND GMBH + CO KG · Alfred-Zippe-Str. 4 · 97877 Wertheim · Germany

Hiermit erklärt der Hersteller, dass die unvollständige Maschine konform ist mit den Bestimmungen dieser Richtlinien:

Hereby the manufacturer declares that the incomplete machinery is in conformity with the following directives:

Par la présente, le fabricant déclare que la quasi-machine est conforme aux directives:

2006/42/EG (M-RL), 2014/34/EU (ATEX-RL), 2011/65/EU, 2015/863 (RoHS-2)

Vakuumpumpstand / Vacuum pumping unit / Groupe de pompage

Typ / Type / Type: VAC 24seven pump module #5 mbar,
VAC 24seven pump module #70 mbar

Artikelnummer / Order number / Numéro d'article: 20745318, 20745118

Seriennummer / Serial number / Numéro de série: Siehe Typenschild / See rating plate / Voir plaque signalétique

Angewandte harmonisierte Normen / Harmonized standards applied / Normes harmonisées utilisées:

DIN EN ISO 12100:2011, DIN EN 1012-2:2011, IEC 61010-1:2010 (Ed. 3), DIN EN 61010-1:2020, DIN EN 1127-1:2019, DIN EN ISO 80079-36:2016, DIN EN IEC 63000:2019

Die technische Dokumentation nach Anhang VII B wurde erstellt. Der Hersteller verpflichtet sich, die technische Dokumentation zur unvollständigen Maschine den zuständigen Stellen in Papierform auf Verlangen zu übermitteln.

Die Inbetriebnahme dieser unvollständigen Maschine ist so lange untersagt, bis festgestellt wurde, dass die Maschine, in die sie eingebaut werden soll, den Bestimmungen der EG-Richtlinie Maschinen, den harmonisierten Normen, europäischen Normen oder den entsprechenden nationalen Normen entspricht.

The technical documentation in accordance with annex VII B has been compiled. The manufacturer undertakes to submit the technical documentation relating to the incomplete machine to relevant national authorities as paper mold on request.

This incomplete machine must not be put into service until the machinery into which it is to be incorporated has been declared in conformity with the provisions of the EC Machinery Directive, the harmonized standards, European stand-ards, or the relevant national standards.

La documentation technique selon l'annexe VII B a été établie. Le fabricant s'engange à remettre la documentation technique concernant la quasi-machine aux services compétents sous forme papier à leur demande.

La mise en service de cette quasi-machine est interdite tant qu'il n'a pas été constaté que la machine dans laquelle elle doit être incorporée est conforme aux dispositions de la directive CE Machines, aux normes harmonisées, aux normes européennes ou aux normes nationales correspondantes.

Bevollmächtigter für die Zusammenstellung der technischen Unterlagen / Person authorised to compile the technical file / Personne autorisée à constituer le dossier technique: Dr. Constantin Schöler · VACUUBRAND GMBH + CO KG · Germany

Ort, Datum / place, date / lieu, date: Wertheim, 29.11.2021

(Dr. Constantin Schöler)
Geschäftsführer / Managing Director / Gérant

(J. Kaibel)
Technischer Leiter / Technical Director / Directeur technique

VACUUBRAND GMBH + CO KG
Alfred-Zippe-Str. 4
97877 Wertheim

Tel.: +49 9342 808-0
Fax: +49 9342 808-5555
E-Mail: info@vacuubrand.com
Web: www.vacuubrand.com

6.4 Declaration of incorporation (UK)

Declaration of incorporation of partly completed machinery

Manufacturer:

VACUUBRAND GMBH + CO KG · Alfred-Zippe-Str. 4 · 97877 Wertheim · Germany

Hereby the manufacturer declares that the incomplete machinery is in conformity with the following directives:

- Supply of Machinery (Safety) Regulations 2008 (S.I. 2008 No. 1597, as amended by S.I. 2019 No. 696)
- The Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2016 (S.I. 2016 No. 1107, as amended by S.I. 2019 No. 696)
- The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 (S.I. 2012 No. 3032)

Product / Type: Vacuum pumping unit / VAC 24seven pump module #5 mbar,
VAC 24seven pump module #70 mbar

Order number: 20745318, 20745118

Serial number: see rating plate

Harmonized standards applied:

EN ISO 12100:2010, EN 1012-2:2010, EN 61010-1:2010+A1:2019, IEC 61010-1:2010 (Ed. 3), EN 1127-1:2019, EN ISO 80079-36:2016, EN IEC 63000:2018

The technical documentation in accordance with annex VII has been compiled. The manufacturer undertakes to submit the technical documentation relating to the incomplete machine to relevant national authorities as paper mold on request.

This incomplete machine must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of the Directive, the harmonized standards or the relevant national standards.

Person authorised to compile the technical file:
Dr. Constantin Schöler · VACUUBRAND GMBH + CO KG · Germany

Place, date: Wertheim, 29.11.2021

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