



Technology for Vacuum Systems

Instructions for use



ME 16C
MZ 8C
MD 8C
MD 12C
MV 10C

Chemistry diaphragm pumps

Dear customer,

Your VACUUBRAND diaphragm pumps should support you for a long time without trouble and with maximal power. Thanks to our long practical experience we have much information how you could ensure powerful application and personal safety. Please read these instructions for use before the initial operation of your pump.

VACUUBRAND diaphragm pumps are the result of many years of experience in construction and practical operation of these pumps combined with the latest developments in material and manufacturing technology.

Our quality maxim is the "zero fault principle":

Every diaphragm pump, leaving our company, is tested intensively including an endurance run of 18 hours. Therefore also faults, which occur rarely, are identified and can be eliminated immediately.

The achievement of the specifications after the endurance run is tested for every pump.

Every VACUUBRAND pump achieves the specifications. We feel obliged to this high quality standard.

We know that the vacuum pump can not take a part of your real work and hope that our products contribute to an effective and trouble-free realisation of your work.

Yours

VACUUBRAND GMBH + CO KG

After sales service: Contact your local dealer or call +49 9342 808-193.



- Danger! Immediate danger. Death or severe injuries as well as damage to equipment and environment can occur.



- ⚠ Warning! Possible danger. Severe injuries as well as damage to equipment and environment can occur.



- Caution! Possible danger. Slight injuries as well as damage to equipment and environment can occur.



Note. Disregarding of notes may cause damage to the product.



Caution! Hot surface!



Isolate equipment from mains before removing the cover.

Contents

Safety information!	4
General information.....	4
Intended use.....	4
Setting up and installing the equipment	4
Ambient conditions	5
Operating conditions	6
Safety during operation	6
Maintenance and repair.....	7
Technical data	9
Gas inlet temperatures	10
Wetted parts	10
Pump parts	11
Use and operation	13
Attention: Important notes regarding the use of gas ballast	14
Shutdown	15
Accessories	16
Troubleshooting	18
Replacing diaphragms and valves	19
Cleaning and inspecting the pump heads	20
Replacing the diaphragm	22
Assembling the pump heads	23
Replacing the valve at the distributor at the outlet (only MD 12C / MV 10C)	24
Assembling the connecting hoses	24
Notes on return to the factory	26
Health and safety clearance form	27

Safety information!

NOTICE

☞ **Read and comply with this manual before installing or operating the equipment.**

☞ Transport the pump at the provided handles.

Remove all packing material, remove the product from its packing-box, remove the protective covers from the inlet and outlet ports and keep. Inspect the equipment.

If the equipment is damaged, notify the supplier and the carrier in writing within three days; state the item number of the product together with the order number and the supplier's invoice number. Retain all packing material for inspection.

Do not use the equipment if it is damaged.

If the equipment is not used immediately, replace the protective covers. Store the equipment in suitable conditions.

Intended use

WARNING

☞ The pump and all system parts are not to be used on humans or animals.

☞ Prevent any part of the human body from coming into contact with vacuum.

☞ Make sure that the individual components are only connected, combined and operated according to their design and as indicated in the instructions for use.

☞ Comply with notes on correct vacuum and electrical connections, see section "Use and operation".

CAUTION

- The pumps are designed for **ambient temperatures** during operation between +10°C and +40°C. Check the maximum temperatures if installing the pump in a cabinet or a housing and make sure ventilation is adequate. Install an external automatic ventilation system if necessary. If pumping hot process gases make sure that the maximum permitted gas inlet temperature, which depends on several parameters like inlet pressure or ambient temperature (see "Technical data"), is not exceeded.

- Particles and dust must not be aspirated.

NOTICE

Use the equipment **for the intended use only**, i.e. for generation of vacuum in vessels designed for that purpose.

Setting up and installing the equipment

DANGER

➤ Equipment must be connected only to a **suitable electrical supply** and a suitable earth point. Failure to connect the motor to ground may result in deadly electrical shock.

The supply cable may be fitted with a moulded European IEC plug or a plug suitable for your local electrical supply. If the plug has been removed or has to be removed, the cable will contain wires colour coded as follows: green or green and yellow: earth; blue or white: neutral; brown or black: live.

WARNING

☞ Due to the high compression ratio of the pumps, pressure at the outlet port might be generated being higher than the maximum permissible pressure compatible with the mechanical stability of the system.

☞ Do not permit any **uncontrolled pressurizing** (e. g. make sure that the exhaust pipeline cannot become blocked). If you have an exhaust isolation valve, make sure that you cannot operate the equipment with the valve closed. **Risk of bursting!**

☞ Provide always a free and pressureless exhaust pipeline.

CAUTION

- Comply with **maximum permissible pressures** at inlet and outlet and pressure differences, see section "Technical data". Do not operate the pump with overpressure at the inlet.
- Check that mains voltage and current conform with the equipment (see rating plate).
- **Direction of rotation** of pumps with **three phase motor**: Pumps wired ready for connection with three phase motor are supplied with a mains plug. The electrical wiring is laid out for a right-handed rotary field.
Checking the direction of rotation:
The three phase socket has to be checked and if necessary corrected by an electrician. Otherwise the performance of the pump might be reduced.
- Avoid overpressure of more than 0.2 bar in case inert gas is connected.
- Connect pipes gas tight at inlet and outlet of the pump.
- **Attention:** Flexible elements tend to shrink when evacuated.

NOTICE

Provide a firm level platform for the equipment and check that the system to be evacuated is mechanically stable and that all fittings are secure. Ensure a stable position of the pump without any mechanical contact except of the pump feet. Comply with all applicable safety regulations.

Keep a distance of minimum 20 cm between fan (underside the pump) and ambient parts (e.g. housing, walls, ...). Make sure the air supply for the fan is adequate. Do not place the pump on soft surfaces (e.g. rubber foam) during operation. This may cut back or block the fan's air supply. Check fan regularly for dust/dirt, clean if necessary to avoid a cutback of ventilation.

If the equipment is brought from cold environment into a room for operation, allow the equipment to warm up (pay attention to water condensation on cold surfaces).

The diameter of the inlet and outlet pipeline should be at the least as large as the diameter of the pump connection pipelines.

Comply with all **applicable and relevant safety requirements** (regulations and guidelines), **implement the required actions and adopt suitable safety measures**.

Ambient conditions

NOTICE

To the best of our knowledge the equipment is in compliance with the requirements of the applicable EC-directives and harmonized standards (see "Declaration of conformity") with regard to design, type and model. Directive IEC 1010 gives in detail conditions, under which the equipment can be operated safely (see also IP degree of protection).

Adopt suitable measures in case of differences, e. g. using the equipment outdoors, installation in altitudes of more than 1000 m above mean sea level, conductive pollution or bedewing.

Pay attention to the **permissible maximum ambient and gas inlet temperatures** (see "Technical data").

Operating conditions



➔ The pumps have no approval for operation in or for pumping of potentially explosive atmospheres.

- ➔ The pumps are **not suitable** to pump
 - **unstable substances** and substances which react explosively under **impact** (mechanical stress) and/or when being exposed to **elevated temperatures** without air.
 - **self inflammable** substances,
 - substances which are inflammable without air and
 - **explosive substances**.



- The pumps are **not suitable** for pumping substances which may form **deposits** inside the pump. Deposits and condensate in the pump may lead to increased temperatures even to the point of exceeding the maximum permitted temperatures!
- If there is a danger of **deposits** in the pump chamber (check inlet and outlet of the pump), inspect the pump chambers regularly and clean if necessary.
- The pumps are **not suitable** for pumping dust and have **no approval** for operation below ground.



If pumping **different substances**, it is recommended to purge the pump with air or inert gas prior to changing the pumped media in order to pump out residues and to avoid reactions of the pumped substances with each other and with the pump materials.

Take into consideration interactions and chemical reactions of the pumped media. Ensure that the materials of the wetted parts are compatible with the pumped substances, see section "Technical data".

Safety during operation



➔ Adopt suitable measures to prevent the release of dangerous, toxic, explosive, corrosive, noxious or polluting fluids, vapours and gases. In case install an appropriate collecting and disposal system and take protective action for pump and environment.

➔ Prevent any part of the human body from coming in contact with vacuum.

➔ The user must take suitable precautions to prevent any formation of explosive mixtures in the expansion chamber or at the outlet. In case of e.g. a diaphragm crack, mechanically generated sparks, hot surfaces or static electricity may ignite these mixtures. Use inert gas for gas ballast or venting if necessary.

➔ Potentially explosive mixtures at the outlet of the pump have to be drained appropriately, sucked off or diluted with inert gas to non-explosive mixtures.



☞ Pay attention to the symbol "hot surfaces" on the equipment. Adopt suitable measures to prevent any danger arising from the formation of hot surfaces or electric sparks. Provide a suitable protection against contact if necessary.



☞ Ensure that the exhaust pipeline is always free and pressureless.

- ☞ Pumping at high inlet pressure may lead to overpressure at the gas ballast valve. Pumped gases or condensate might be pushed out in case the valve is open. If an inert gas supply is connected, ensure that the inlet pipeline is not contaminated.

CAUTION

- Comply with applicable regulations when disposing of chemicals. Take into consideration that chemicals may be polluted. Take adequate precautions to protect people from the effects of dangerous substances (chemicals, thermal decomposition products of fluoroelastomers), wear appropriate safety-clothing and safety glasses.
- Use only **OEM spare parts and accessories**. Otherwise safety and performance of the equipment as well as the electromagnetic compatibility of the equipment might be reduced. Possibly the CE mark or the cTÜVus mark become void if not using OEM spare parts.

NOTICE

Do not start the pump if the pressure difference between inlet and outlet port exceeds 1.1 bar at maximum.

Prevent the backpressure of gases and the backflow of condensates. Never suck liquids or dust into the pump.

Provide appropriate protective measures (i.e. precautions which allow for the requirements of the respective application) even for the case of failure and **malfunction**.

Failure of the pump (e.g. due to power failure) or of connected components, parts of the supply or change of parameters must not lead to a critical dangerous situation under any circumstances. In case of diaphragm cracks or leaks in the manifold pumped substances might be released into the environment or into the pump housing or motor. Comply especially with notes on operation and use and maintenance.

Due to the residual **leak rate of the equipment**, there might be an exchange of gas, albeit extremely slight, between the environment and the vacuum system. Adopt suitable measures to prevent contamination of the pumped substances or the environment.

In case of overload the motor is shut down by a **self-hold thermal cutout** in the winding.

Three-phase motors are equipped with a **circuit-breaker** which isolates all poles in the event of an overload.

Attention: Reset possible only manually. Switch off the pump or isolate the equipment from mains. Identify and eliminate the cause of failure. Allow the pump to cool down sufficiently before restart. Wait approx. five minutes before restarting the pump. Avoid high heat supply (e.g. due to hot process gases).

The A-weighted emission sound pressure level of the pump does not exceed 70 dB(A). Measurement according to EN ISO 2151:2004 and EN ISO 3744:1995 with standard silencer or exhaust tube at outlet.

Maintenance and repair

NOTICE

Wear parts have to be replaced regularly. In case of normal wear the lifetime of the diaphragms and valves is > 10000 operating hours. Bearings have a typical durability of 40000 h. Motor capacitors have a typical durability in the range of 10000 to 40000 h depending strongly on the operation conditions like ambient temperature, humidity or load.

CAUTION

- Check every capacitor regularly by measuring its capacity and estimating its operation time. Exchange old capacitors early enough to prevent a failure. If an overaged motor capacitor fails it might get hot and even melt and may cause a flame to form which could be **dangerous for persons and equipment in the vicinity**. The capacitors have to be replaced by an electrician.



- **Isolate equipment from mains.**
- Before starting maintenance, wait **two minutes** after isolating the equipment from mains to allow the capacitors to discharge.

WARNING

- ⚠ **Ensure that the pump cannot be operated accidentally. Never operate the pump if covers or other parts of the pump are disassembled. Never operate a defective or damaged pump.**

- ⚠ **Attention:** The pump might be contaminated with process chemicals which have been pumped during operation. Ensure that the pump is decontaminated before maintenance and take adequate precautions to protect people from the effects of dangerous substances if contamination has occurred.

CAUTION

- Before starting maintenance vent the pump, isolate the pump and other components from the vacuum system. Allow sufficient cooling of the pump. Drain condensate, if applicable.

Ensure that **maintenance** is done only by suitably trained and supervised technicians. Ensure that the maintenance technician is familiar with the safety procedures which relate to the products processed by the pumping system.

In order to comply with law (occupational, health and safety regulations, safety at work law and regulations for environmental protection) vacuum pumps, components and measuring instruments returned to the manufacturer can be repaired only when certain procedures (see section "**Notes on return to the factory**") are followed.

Technical data

Typ		ME 16C	MZ 8C	MD 8C	MD 12C	MV 10C
Maximum pumping speed 50/60 Hz (ISO 21360)	m ³ /h	10.1 / 11.6	6.2 / 7.1	5.8 / 6.7	8.3 / 8.9	7.0 / 7.5
Ultimate vacuum (absolute) without gas ballast	mbar	< 80	9	2		0.9
Ultimate vacuum (absolute) with gas ballast	mbar	150	15	9		
Maximum permissible inlet pressure (absolute)	bar	1,1				
Maximum permissible outlet pressure (absolute)	bar	1,1				
Maximum permissible pressure (absolute) at gas ballast	bar	1.2				
Permissible ambient temper- ature storage / operation	°C	-10 to +60 / +10 to +40				
Permissible relative at- mospheric moisture during operation (no condensation)	%	30 to 85				
Rated motor power	kW	0.39				
No-load speed 50/60 Hz	min ⁻¹	1500 / 1800				
Maximum permissible range of supply voltage Attention: Observe speci- fications of rating plate!		100 V~ ±10% 50/60 Hz 120 V~ +5%/-10% 60 Hz 230 V~ ±10% 50/60 Hz 400 V 3~ ±10% 50 Hz				
Maximum rated current at:						
100 V~ 50/60 Hz*	A	6.4 / 6.2	6.4 / 6.2	6.4 / 6.2	-	-
120 V~ 60 Hz*	A	5.3	5.3	5.3	5.3	5.3
230 V~ 50/60 Hz*	A	2.8 / 2.7	2.8 / 2.7	2.8 / 2.7	2.8 / 2.7	2.8 / 2.7
400 V 3~ 50 Hz	A	1.2	1.2	1.2	-	-
Motor protection single-phase three-phase		thermal cutout, manual reset in case of an overload, all poles are isolated				
Degree of protection IEC 529		IP 20				
Inlet		small flange KF DN 25				
Outlet		hose nozzle DN 10 mm				
Dimensions L x W x H approx.	mm	515 x 237 x 294	490 x 237 x 294		505 x 237 x 294	
Weight approx.	kg	25.0			25.2	

* During the start-up period of the pump (first 6 minutes after switching-on) the current draw might be elevated (up to twice the given nominal current draw).

We reserve the right for technical modification without prior note!

Gas inlet temperatures

Operating condition	Inlet pressure	Permitted range of gas temperatures at inlet
Continuous operation	> 100 mbar (high gas load)	+10°C to +40°C
Continuous operation	< 100 mbar (low gas load)	0°C to +60°C
Short-time (< 5 minutes)	< 100 mbar (low gas load)	-10°C to +80°C

Wetted parts

Components	Wetted materials
Outlet	ETFE
Inlet	Stainless steel
Diaphragm clamping disc	ETFE carbon fibre reinforced
Diaphragm	PTFE
Valves	FFKM
Valves (ME 16C)	PTFE
Head cover	ETFE carbon fibre reinforced
Housing cover insert	PTFE carbon reinforced
O-ring (only MV 10C)	FPM
Tubing	PTFE
Fittings	ETFE

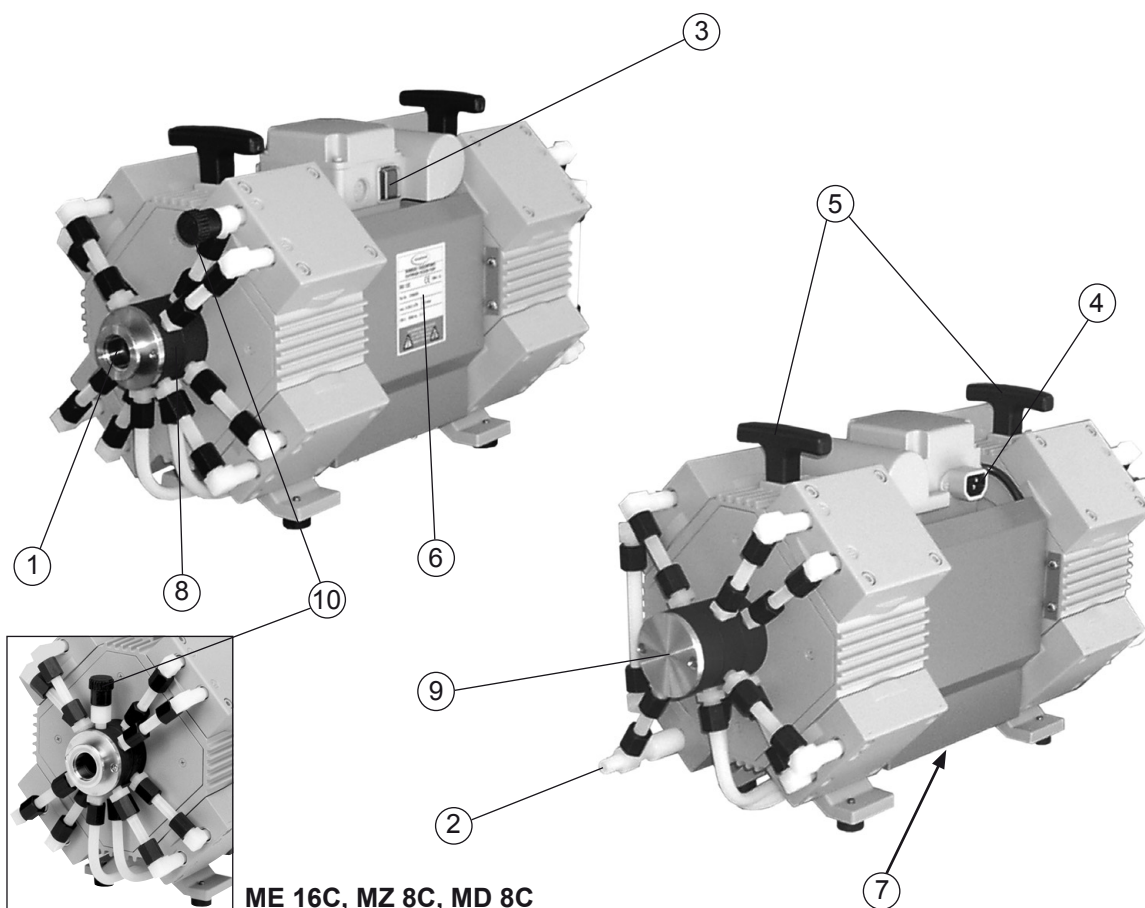
We reserve the right for technical modification without prior notice!

Pump parts

Position	Component
1	Inlet
2	Outlet
3	On/off switch
4	Mains connection
5	Handle
6	Pump rating plate
7	Fan
8	Distributor at the inlet
9	Distributor at the outlet
10	Gas ballast valve

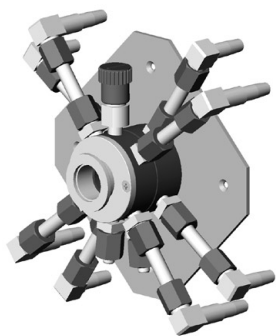
ME 16C, MZ 8C, MD 8C, MD 12C, MV 10C

(fig.: MD 12C, 230V version)

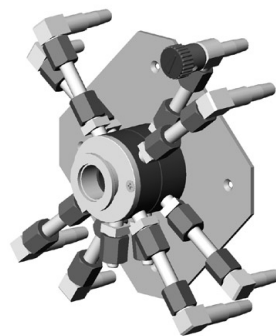


Fittings at inlet side:

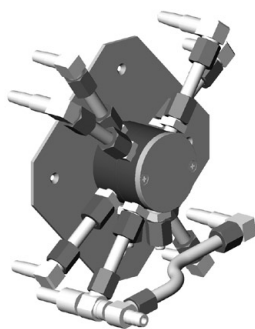
**ME 16C
MZ 8C
MD 8C**



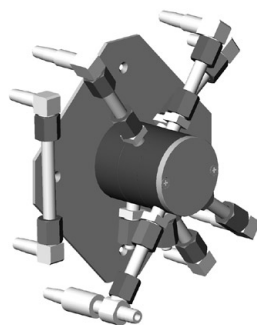
**MD 12C
MV 10C**



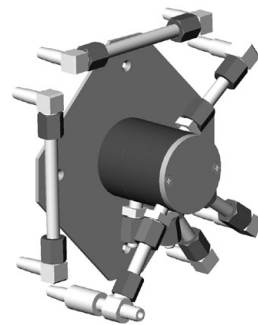
Fittings at outlet side:



**ME 16C
MZ 8C
MD 8C**



MD 12C



MV 10C

Use and operation

Installing in a vacuum system

CAUTION

- Connection lines at the pump inlet have to be gas tight. Particles and dust must not be aspirated, the user has to provide appropriate filters if necessary. The user must ensure their suitability concerning gas flow, chemical resistance and safety against clogging prior to use.
- Connect an exhaust line gas tight at the pump outlet if necessary. Always dispose of exhaust gases appropriately (e.g. into a fume hood). If there is risk of release of dangerous or polluting fluids, install an appropriate system to catch and dispose of those fluids.
- Reduce the transmission of vibration and prevent mechanical load due to rigid pipelines. Insert elastic hoses or flexible elements as couplings between the pump and rigid pipes. **Attention:** Flexible elements tend to shrink when evacuated.
- The gas outlet must never be blocked. The exhaust line has always to be free (pressureless) to ensure an unimpeded discharge of gas.
- In case of mains failure accidental venting of the system, especially with an open gas ballast, may occur. If this may cause possible dangers provide suitable safety measures.
- Make sure ventilation is adequate especially if the pump is installed in a housing or if the ambient temperature is elevated. Provide external ventilation if necessary.

NOTICE

Avoid throttling losses by using connecting pipes with large diameter and by keeping them as short as possible.

Install outlet pipelines always falling to avoid backflow of condensate towards the pump.

Use of a suitable valve to isolate the pump from the vacuum system is recommended to allow the pump to warm up before pumping condensable vapours or to clean the pump before it is switched off.

When assembling, ensure **vacuum-tightness**. After assembly, check the whole system for leaks.

Secure hose connections at the pump appropriately against unintentional detaching.

During operation

CAUTION

- **Maximum ambient temperature:** 40 °C
- Make sure ventilation is adequate especially if the pump is installed in a housing or if the ambient temperature is elevated. Keep a distance of minimum 20 cm between fan (underside the pump) and ambient parts (e.g. housing, walls, ...).
- **Potentially dangerous gases or vapours** at the outlet of the pump have to be drained and disposed appropriately.

- Due to the high compression ratio of the pumps, the pressure at the outlet port might get higher than the maximally permitted pressure compatible with the **mechanical stability** of the system. Ensure that the pump outlet is not blocked or restricted.

NOTICE

If the pump is installed in altitudes of more than 1000 m above mean sea level check compatibility with applicable safety requirements, especially IEC 60034 (motor might overheat due to insufficient cooling).

Do not start the pump if the **pressure at outlet port** exceeds **maximum 1.1 bar (absolute)**. Attempts to start the pump at higher pressures may cause blockade and damage of the motor.

Check compatibility with **maximally permitted pressure** at inlet and outlet.

Prevent internal condensation, transfer of liquids or dust. The diaphragm and valves will be damaged, if liquids are pumped in significant amounts.

Check the pump regularly for external soiling and deposits, clean if necessary to avoid an increase of the pump's operating temperature.

If pumping condensable vapours (water vapour, solvents,), let the pump run with gas ballast to reduce condensation in the pump.

In case of excess temperature, the motor is shut down by a **thermal cutout** in the winding.

Three-phase motors are equipped with a **circuit-breaker** which isolates all poles in the event of an overload.

Attention: Reset possible only manually. Switch off the pump or isolate the equipment from mains. Identify and eliminate the cause of failure. Allow the pump to cool down sufficiently before restart. Wait approx. five minutes before restarting the pump.

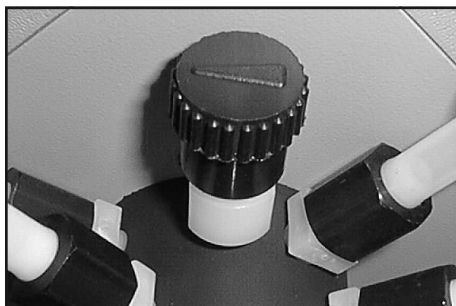
Avoid high heat supply (e.g. due to hot process gases). Make sure the air supply for the fan is adequate. Do not place the pump on soft surfaces (e.g. rubber foam) during operation. This may cut back or block the fan's air supply. Check fan regularly for dust/dirt, clean if necessary to avoid a cutback of ventilation.

A warm up period (approx. 15 min.) is required to ensure that the rated ultimate vacuum and pumping speed are attained.

Attention: Important notes regarding the use of gas ballast

DANGER

- ➔ When using air rather than inert gas, risk of significant damage to equipment and/or facilities, risk of personal injury or even loss of life exists due to the formation of hazardous and/or explosive mixtures if air and pumped media react inside or at the outlet of the pump.
- ➔ Make sure that air/gas inlet through the gas ballast valve never leads to hazardous, explosive or otherwise dangerous mixtures. If in doubt, use inert gas.



In case of condensable vapours (water vapour, solvents, ...):

- ☞ Do not pump vapour until the pump has reached its operating temperature.
- ☞ Open gas ballast valve. The gas ballast valve is open if the arrow on the gas ballast cap points towards the side of the pump with rating plate (ME 16C/ MZ 8C / MD 8C) or away from the pump's inlet (MD 12C / MV 10C).
- ☞ With gas ballast valve open ultimate vacuum will be reduced, pumping speed is decreased.
- ☞ Use inert gas at the air inlet to avoid the formation of explosive mixtures.
- ☞ Close gas ballast valve by turning it 180°.

In case of low boiling solvents when the formation of condensate is unlikely, the use of gas ballast might be unnecessary.
Operating the pump without gas ballast increases the solvent recovery rate at the exhaust waste vapour condenser (see "Accessories").

Shutdown

Short-term:

Has the pump been exposed to condensate?

- Allow the pump to continue to run at atmospheric pressure for a few minutes.

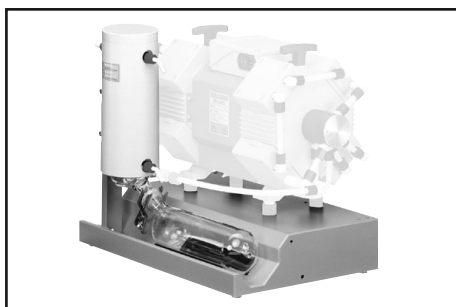
Has the pump been exposed to media which may damage the pump materials or form **deposits**?

- Check and clean pump heads if necessary.

Long-term:

- Take measures as described in section short-term shutdown.
- Separate pump from the application.
- Close manual gas ballast valve.
- Close inlet and outlet port (e. g. with transport caps).
- Store the pump in dry conditions.

Accessories



Base plate with exhaust waste vapour condenser and collecting flask.....699949

Set of casters.....699981
(for base plate)



Separator (inlet)699980
(small flange KF DN 25)

Centring ring.....660196
(with FPM seal)

Clamping ring DN 20/25 (aluminium)660001

PTFE vacuum hose (antistatic) with stainless steel small flanges. The inner side of the PTFE hose is smooth for increased chemical resistance, reduced deposits and high conductance

KF 16, 500 mm686030

KF 16, 1000 mm686031

KF 25, 500 mm686032

KF 25, 1000 mm686033

Vacuum hose (caoutchouc) 10 mm ID686002

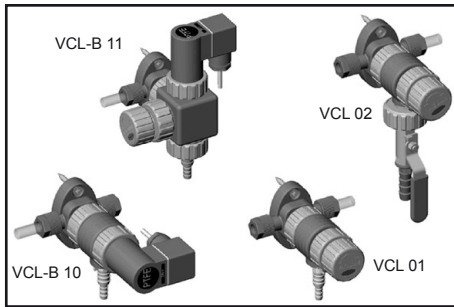
Metal hose (stainless steel) KF DN 25 (1000mm) ..673337



Digital vacuum gauge DVR 2682902



Vacuum controller CVC 3000683160
100-230 V 50-60 Hz



The VACUU•LAN® modules allow process oriented, flexible and cost effective connections according to the requirements: One vacuum pump for multiple work stations.

VACUU•LAN® manual flow control module	
VCL 01	677106
VACUU•LAN® shut off / manual flow control module VCL 02	677107
VACUU•LAN® automatic control module	
VCL-B 10	677208
VACUU•LAN® manual flow control/automatic control module VCL-B 11	677209

On this page we offer only a small selection of VACUU•LAN® options. Please refer for further information.

For additional accessories such as vacuum valves, small-flange components, vacuum gauges or vacuum controllers refer to www.vacuubrand.com

Troubleshooting

Fault	Possible cause	Remedy
<input type="checkbox"/> Pump does not start or stops immediately.	<ul style="list-style-type: none"> ➔ Mains not plugged in, electrical supply failure? ➔ Overpressure in the exhaust line? ➔ Motor overload? 	<ul style="list-style-type: none"> ✓ Plug in mains. Check fuse. ✓ Open exhaust line, ensure a free (pressureless) outlet line. ✓ Allow motor to cool down, identify and eliminate cause of failure. Manual reset is necessary. Switch off pump or unplug mains.
<input type="checkbox"/> Pump does not achieve its ultimate vacuum or usual pumping speed.	<ul style="list-style-type: none"> ➔ Centring ring at small flange connection not correctly positioned or leak in the pipeline or vacuum system? ➔ Long, narrow line? ➔ Pump has been exposed to condensate? ➔ Deposits have been formed inside the pump? ➔ Diaphragms or valves damaged? ➔ Outgassing substances or vapour generated in the process? 	<ul style="list-style-type: none"> ✓ Check pump directly - connect vacuum gauge directly at pump inlet - then check connection, pipeline and vacuum system if necessary. ✓ Use lines with larger diameter, length as short as possible. ✓ Allow pump to run for some minutes with atmospheric pressure at the inlet. ✓ Clean and inspect the pump heads. ✓ Replace diaphragms and/or valves. ✓ Check process parameters.
<input type="checkbox"/> Pump too noisy.	<ul style="list-style-type: none"> ➔ Loud exhaust noise? ➔ Diaphragm crack or diaphragm clamping disc loose? ➔ Other than above mentioned causes? 	<ul style="list-style-type: none"> ✓ Connect hose or silencer to pump outlet. ✓ Perform maintenance. ✓ Contact local distributor.
<input type="checkbox"/> Pump seized.		<ul style="list-style-type: none"> ✓ Contact local distributor.

NOTICE

A service manual with exploded view drawings, spare parts list and directions for repair is available on request.

 The service manual is intended for trained service people only.

Replacing diaphragms and valves

NOTICE

All bearings are encapsulated and are filled with long-life lubricant. Under normal operating conditions, the pump is maintenance free. The valves and diaphragms as well as the motor capacitors are wear parts. If the rated ultimate vacuum is no longer achieved or in case of increased noise level, the pump interior, the diaphragms and the valves must be cleaned and the diaphragms and valves must be checked for cracks or other damage. Check every capacitor regularly by measuring its capacity and estimating its operation time. Exchange old capacitors early enough to prevent a failure. The capacitors have to be replaced by an electrician. Depending on individual cases it may be efficient to check and clean the pump heads on a regular basis. In case of normal wear the lifetime of the diaphragms and valves is > 10000 operating hours.

- Prevent internal condensation, transfer of liquids or dust. The diaphragm and valves will be damaged, if liquids are pumped in significant amount.

If the pump is exposed to corrosive gases or vapour or in case of deposits, maintenance should be carried out frequently.

- Regular maintenance will improve the lifetime of the pump and also protect both man and environment.

Ensure that maintenance is done only by suitable trained and supervised technicians.

WARNING



- ☞ Ensure that the pump cannot be operated accidentally. **Never operate the pump if covers or other parts of the pump are disassembled. Never operate a defective or damaged pump.**

- ☞ **Before starting maintenance** isolate the pump from the electrical supply and wait **two minutes** after isolating the equipment from mains to allow the capacitors to discharge. Avoid the release of pollutants. Allow sufficient cooling of the pump.

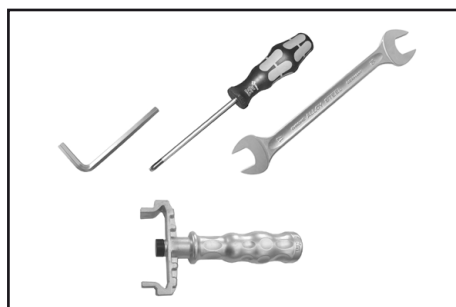
CAUTION

- Attention: The pump might be contaminated with the process chemicals that have been pumped during operation. Ensure that the pump is decontaminated before maintenance and take adequate precautions to protect people from the effects of dangerous substances if contamination has occurred. Ensure that the maintenance technician is familiar with the safety procedures which relate to the products processed by the pumping system.
- Wear appropriate safety-clothing when you come into contact with contaminated components. Avoid the release of pollutants.

NOTICE

Before starting maintenance vent the pump and isolate it from the vacuum system.

Set of seals (diaphragms, valves, seals)	696821
Set of seals for ME 16C (diaphragms, valves)	8x 696813
Diaphragm key (w/f 66)	636554



Tools required (metric):

- Phillips screw driver size 2
- Open-ended wrench w/f 14/16/17
- Hex key size 5
- Diaphragm key w/f 66

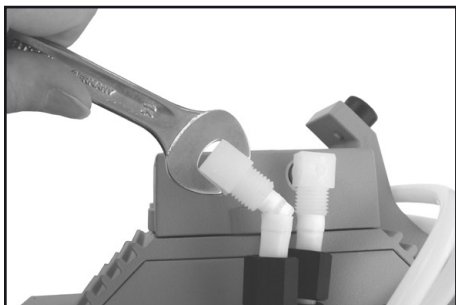
- ☞ **Please read section "Replacing diaphragms and valves" completely before starting maintenance.**

Partially the pictures show pumps in other versions. This doesn't influence replacing diaphragms and valves of the pump.

Cleaning and inspecting the pump heads

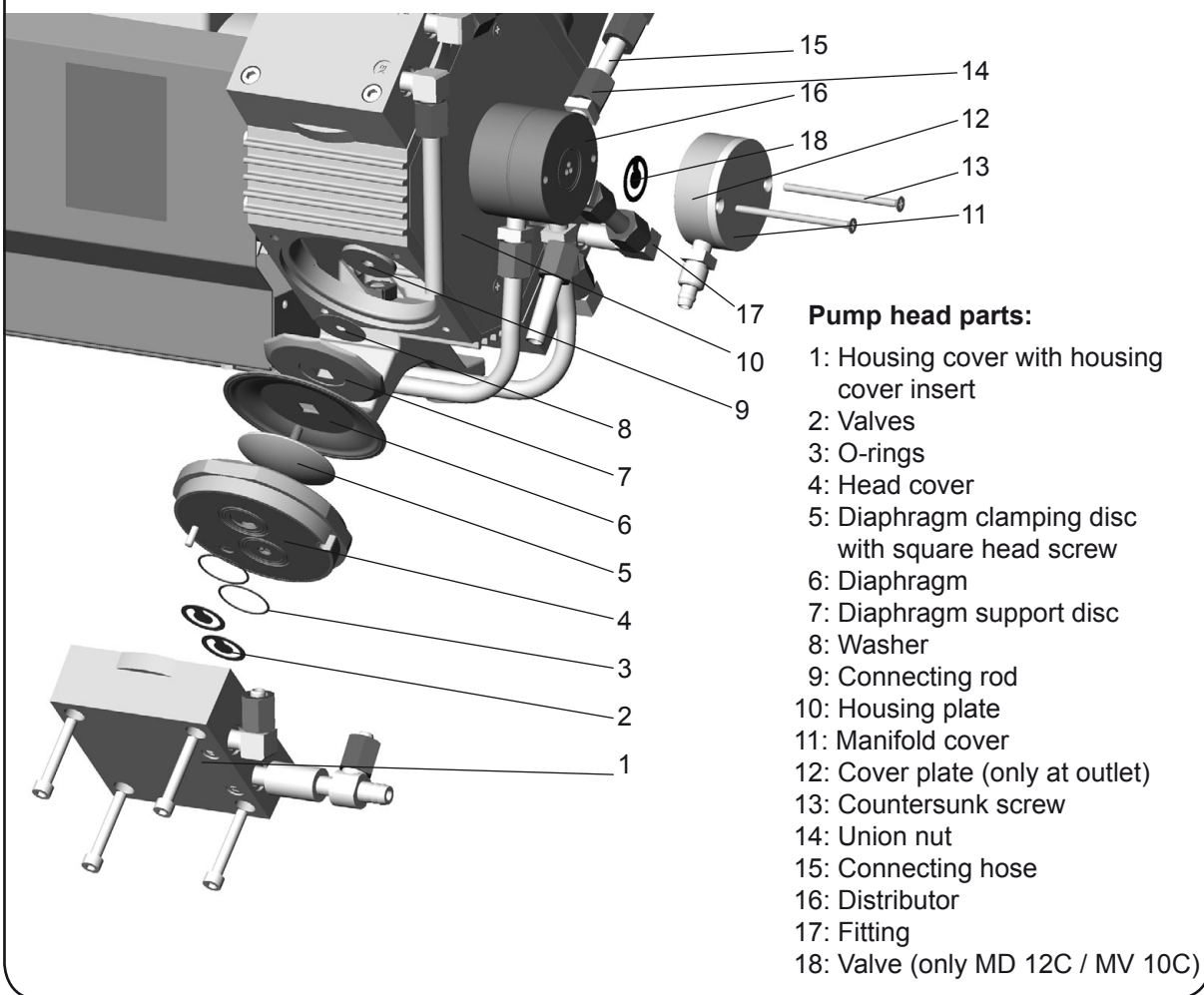


- ➔ Use an open-ended wrench (w/f 17) to remove the union nuts of the hose connections at the pump heads.

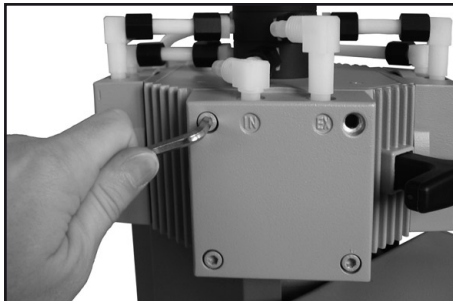
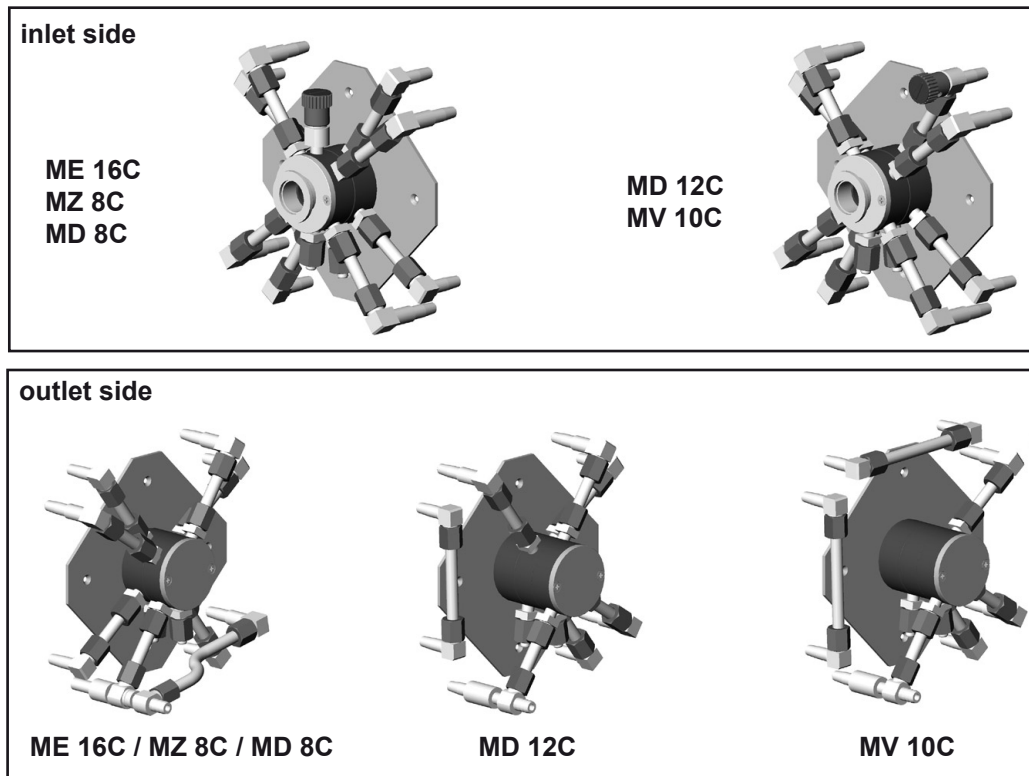


- ➔ Turn the fittings with an open-ended wrench (w/f 14, at outlet w/f 16) to detach the hoses from the pump heads.
- ⚠ Do not remove the elbow fittings from the pump heads. Through reassembly a leak may result.

View of the disassembled pump head parts

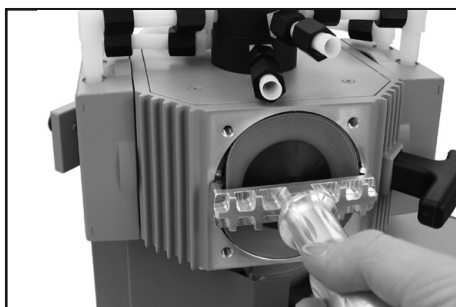


Fittings of different pump types:



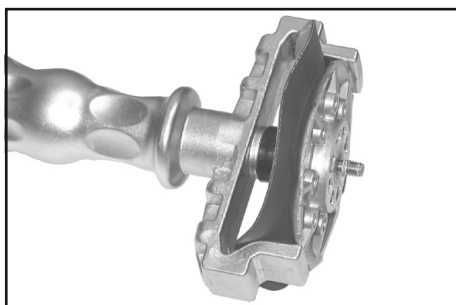
- ➔ To check the valves and the diaphragms use a hex key to remove four socket-head screws from the pump head and remove the upper part of the housing (housing cover with housing cover insert) together with the head cover, the valves and the O-rings.
- ⚠ Never remove parts by using a spiky or sharp-edged tool (e.g. screw driver), we recommend to use a rubber mallet or compressed air (to be blown carefully into port).
- ➔ Remove the head cover carefully from the upper part of the housing. Note the position of the valves and remove them.
- ⚠ Replace valves and/or O-rings if damaged.
- ⚠ Use petroleum ether or industrial solvent to remove deposits. Do not inhale.

Replacing the diaphragm

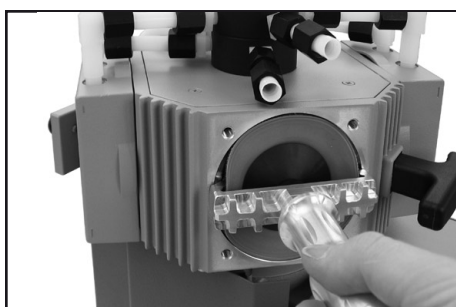


- ☞ Check diaphragm for damage and replace if necessary.
- ➔ Lift diaphragm carefully sidewise.
- ☞ Never use a spiky or sharp-edged tool to lift the diaphragm.
- ➔ Use the diaphragm key to grip the diaphragm support disc below the diaphragm.
- ➔ Unscrew diaphragm support disc with diaphragm and diaphragm clamping disc.

- ➔ Check for washers between the diaphragm support disc and the connecting rod. Do not mix the washers from the different pump heads. Make sure that the original number is reassembled at the individual pump head.
- ☞ If the old diaphragm is difficult to separate from the support disc, immerse assembly in naphtha or petroleum ether. Do not inhale!
- ☞ Too small number of washers: The pump will not attain ultimate vacuum. Too many washers: Clamping disc will hit head cover; noise or even blockade of the pump.



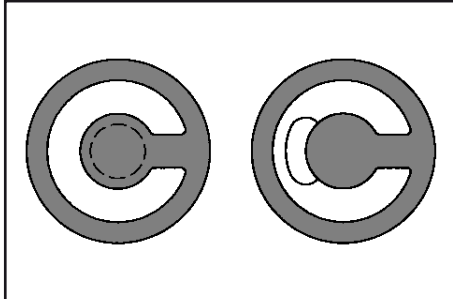
- ➔ Position new diaphragm between diaphragm clamping disc with square head screw and diaphragm support disc.
- ☞ **Attention:** Position diaphragm with pale side towards diaphragm clamping disc (to pump chamber).
- ☞ Make sure that the square head screw of the diaphragm clamping disc is correctly seated in the guide hole of the diaphragm support disc.
- ➔ Lift diaphragm at the side and position carefully together with diaphragm clamping disc and diaphragm support disc in the diaphragm key.
- ☞ Avoid damage of the diaphragm: Do not bend diaphragm too much.



- ➔ Assemble the original number of washers between support disc and connecting rod.
- ➔ Screw diaphragm clamping disc, diaphragm, diaphragm support disc and washers to connecting rod.
- ☞ Optimum torque for the diaphragm support disc: 6 Nm, it is recommended to use a torque key. Attach hex key to diaphragm key (hexagonal bolt 6 mm wide).
Attention: Never use the diaphragm key with any additional tools like tongs or hex keys without torque limitation.

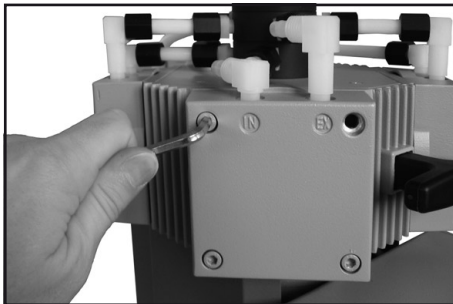
Assembling the pump heads

- ➔ Bring connecting rod into a position in which the diaphragm is in contact with the housing and centred with respect to the bore.



Reassemble in reverse order.

- ➔ Install head cover with O-rings, valves and housing cover with housing cover insert.
- ☞ Make sure that the valves are correctly seated: Valves at the outlet with round centred opening under valve, valves at the inlet with kidney-shaped opening beside valve.
- ☞ Pay attention that the diaphragm stays positioned centrally so that it will become clamped uniformly between housing and head cover.



- ➔ Screw in four socket head screws fixing the housing cover crosswise first slightly, then tighten.
- ☞ Do not tighten until head cover is in contact with housing, torque 12 Nm.

Individual performance check of a pump head:

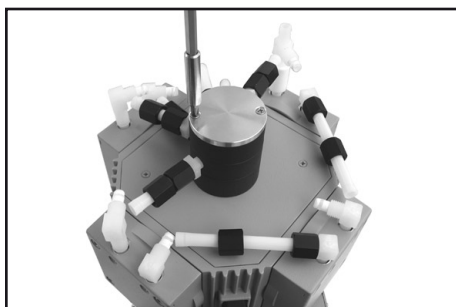
By measuring the pressure at the inlet port of the individual head:

Use a suitable vacuum gauge (e. g. DVR 2, cat. no.: 682902), make sure that it is correctly calibrated, and measure the pressure at the inlet port. A vacuum of less than 120 mbar should be indicated.

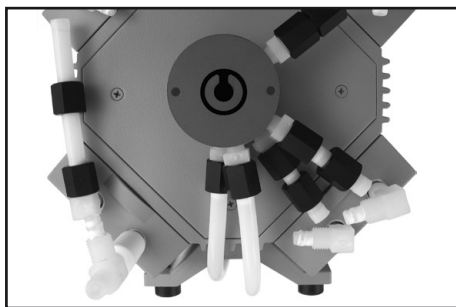
- ☞ If the reading is higher, recheck the pump chamber and make sure that the valves and the diaphragms are correctly seated (diaphragms concentric with bore).

Replace diaphragms and valves of the opposite side of the pump in the same way!

Replacing the valve at the distributor at the outlet (only MD 12C / MV 10C)

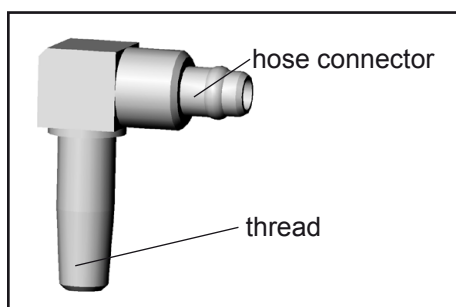


- ➔ Use open-ended wrench (w/f 17) to loosen the union nut of the hose, which runs directly to the cover plate of the distributor, at the pump head.
- ➔ Use open-ended wrench (w/f 14) to turn elbow fitting 1/4 of a turn, remove hose. Do not remove the elbow fitting from the pump head.
- ➔ Unscrew the two countersunk head screws at the manifold cover with an Phillips screw driver and remove cover plate and manifold cover.



- ➔ Note position of valve and remove.
- ☞ Check valve for damage and replace if necessary. Make sure that the valve is correctly seated.
- ➔ Reassemble manifold cover and cover plate and fixate with countersunk screws.

Notes on assembling fittings and hose connections (only MV 10C)

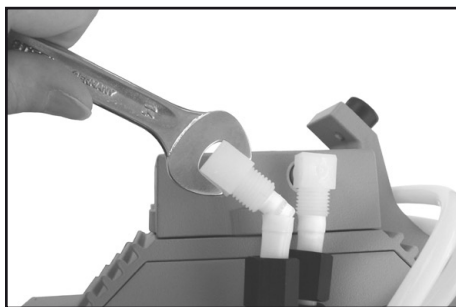


The thread of the fittings at the pump heads, at the inlet and outlet distributors as well as the hose connectors are sealed with PTFE bond.

If the fittings or the hoses have been removed, use new PTFE bond (included in set of seals) when reassembling.

Wind the thread of the fitting two times counterclockwise with PTFE bond, the hose connectors three times. Ensure that the PTFE bond ends flush with the fittings.

Assembling the connecting hoses



- ➔ Use an open-ended wrench w/f 14 (w/f 16 at outlet) to slip the hoses onto the hose connectors by turning the fittings.



- ➔ Tighten the union nuts of the hose connections at the pump heads with an open-ended wrench w/f 17.
- ☞ Tighten union nuts first by hand and then tighten one full turn using the open ended wrench.

If the pump does not achieve the ultimate vacuum:

- ☞ In case the diaphragms and valves have been replaced, a run-in period of several hours is required before the pump achieves its ultimate vacuum.
- ☞ In case of unusual noise switch off pump immediately and check clamping disc positions.

If the specified ultimate vacuum is not achieved and if this does not change after the run-in period:

Check hose connectors at pump head for leaks. If necessary recheck valve seats and pump chambers.

Notes on return to the factory

Repair - return - DKD calibration

NOTICE

Safety and health of our staff, laws and regulations regarding the handling of dangerous goods, occupational health and safety regulations and regulations regarding safe disposal of waste require that for all pumps and other products the **“Health and safety clearance form”** must be sent to our office duly completed and signed before any equipment is dispatched to our premises.

Fax or post a completed copy of the health and safety clearance form to us in advance. The declaration must arrive before the equipment. Enclose a second completed copy with the product. If the equipment is contaminated you must notify the carrier.

No repair / DKD calibration is possible unless the correctly completed form is returned. Inevitably, there will be a delay in processing the equipment if information is missing or if this procedure is not obeyed.

If the product has come in contact with chemicals, radioactive substances or other substances dangerous to health or environment, the product must be decontaminated **prior to sending it back to the factory.**

- Return the product to us **disassembled and cleaned** and accompanied by a certificate verifying decontamination or
- Contact an industrial cleaning and **decontamination service** directly or
- Authorize us to send the product to an industrial cleaning facility **at your expense.**

To expedite repair and to reduce costs, please enclose a detailed description of the problem and the product's operating conditions with every product returned for repair.

We submit **quotations** only on request and always at the customer's expense. If an order is given, the costs incurred are offset from the costs for repair or from the purchase price, if the customer prefers to buy a new product instead of repairing the defective one.

- **If you do not wish a repair on the basis of our quotation, the equipment might be returned to you disassembled and at your charge!**

In many cases, the **components must be cleaned in the factory** prior to repair. For cleaning we use an environmentally responsible water based process. Unfortunately the combined attack of elevated temperature, cleaning agent, ultrasonic treatment and mechanical stress (from pressurised water) may result in damage to the paint. Please mark in the health and safety clearance form if you wish a **repaint at your expense** just in case such a damage should occur.

We also replace parts due to optical aspects upon your request.

NOTICE

Before returning the equipment ensure that (if applicable):

- Equipment has been cleaned and/or decontaminated.
- All inlet and outlet ports have been sealed.
- Equipment has been properly packed, if necessary, please order an original packaging (costs will be charged), marked as appropriate and the carrier has been notified.
- Ensure that the completed health and safety declaration is enclosed.

We hope for your understanding for these measures, which are beyond our control.

Scrapping and waste disposal:

Dispose of the equipment and any components removed from it safely in accordance with all local and national safety and environmental requirements. Particular care must be taken with components and waste oil which have been contaminated with dangerous substances from the process. Do not incinerate fluoroelastomer seals and O-rings.

- You may authorize us to dispose of the equipment **at your expense.**

Health and safety clearance form

Declaration concerning safety, potential hazards and safe disposal of waste, e. g. used oil.

Safety and health of our staff, laws and regulations regarding the handling of dangerous goods, occupational health and safety regulations, safety at work laws and regulations regarding safe disposal of waste, e. g. waste oil, require that for all pumps and other products this form must be sent to our office duly completed and signed before any equipment is dispatched to our premises. **Products will not be accepted for any procedure, and handling and repair / DKD calibration will not start before we have received this declaration.**

- Fax or post a **completed copy of this form** to us in advance. The declaration must arrive before the equipment. **Enclose a second, completed copy with the product.** If the product is contaminated you must notify the carrier (**GGVE, GGVS, RID, ADR**).
- Inevitably, the repair process will be delayed considerably, if this information is missing or this procedure is not obeyed. We hope for your understanding for these measures which are beyond our control and that you will assist us in expediting the repair procedure.
- Make sure that you know all about the substances which have been in contact with the equipment and that all questions have been answered correctly and in detail.**

<p>1. Product (Model):</p> <p>2. Serial No.:</p> <p>3. List of substances in contact with the equipment or reaction products:</p> <p>3.1 Chemical/substance name, chemical symbol:</p> <p>a)</p> <p>b)</p> <p>c)</p> <p>d)</p> <p>3.2 Important information and precautions, e. g. danger classification:</p> <p>a)</p> <p>b)</p> <p>c)</p> <p>d)</p> <p>4. Declaration (please mark as applicable):</p> <p><input type="checkbox"/> 4.1 for non dangerous goods: We assure for the returned product that</p> <ul style="list-style-type: none"> - neither toxic, corrosive, biologically active, explosive, radioactive nor contamination dangerous in any way has occurred. - the product is free of dangerous substances. - the oil or residues of pumped media have been drained. <p><input type="checkbox"/> 4.2 for dangerous goods: We assure for the returned product that</p> <ul style="list-style-type: none"> - all substances, toxic, corrosive, biologically active, explosive, radioactive or dangerous in any way which have been pumped or been in contact with the product are listed in 3.1, that the information is complete and that we have not withheld any information. - the product, in accordance with regulations, has been <p><input type="checkbox"/> cleaned <input type="checkbox"/> decontaminated <input type="checkbox"/> sterilized.</p>	<p>5. Way of transport / carrier: Day of dispatch to VACUUBRAND:</p> <p>If the paint is damaged, we wish a repaint or a replacement of parts due to optical aspects at our expense (see "Notes on return to the factory"):</p> <p><input type="checkbox"/> yes <input type="checkbox"/> no</p> <p>We declare that the following measures - where applicable - have been taken:</p> <ul style="list-style-type: none"> - The oil has been drained from the product. Important: Dispose of according to national regulations. - The interior of the product has been cleaned. - All inlet and outlet ports of the product have been sealed. - The product has been properly packed, if necessary, please order an original packaging (costs will be charged), and marked as appropriate. - The carrier has been informed about the hazardous nature of the goods (if applicable). <p>We assure VACUUBRAND that we accept liability for any damage caused by providing incomplete or incorrect information and that we shall indemnify VACUUBRAND from any claims as regards damages from third parties.</p> <p>We are aware that as expressed in § 823 BGB (Public Law Code of Germany) we are directly liable for injuries or damages suffered by third parties, particularly VACUUBRAND employees occupied with handling/repairing the product.</p> <p>Signature:</p> <p>Name (print):</p> <p>Job title (print):</p> <p>Company's seal:</p> <p>Date:</p>
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**Konformitätserklärung
Declaration of conformity
Déclaration de conformité**

Membranpumpe / Diaphragm pump / Pompe à membrane

ME 16C (230V; 696467, 696511, 696512)

MZ 8C (230V; 696461, 696491, 696492)

MD 8C (230V; 696464, 696501, 696502)

MD 12C (230V; 710150, 710151, 710152)

MV 10C (230V; 710200, 710201, 710202)

Hiermit erklären wir, dass das oben bezeichnete Gerät in Konzeption und Bauart sowie in der von uns in Verkehr gebrachten Ausführung den grundlegenden Anforderungen der zutreffenden, aufgeführten EU-Richtlinien entspricht. Bei einer mit uns nicht abgestimmten Änderung an dem Gerät verliert diese Erklärung ihre Gültigkeit.

We herewith declare that the product designated above is in compliance with the basic requirements of the applicable EC-directives stated below with regard to design, type and model sold by us. This certificate ceases to be valid if the product is modified without the agreement of the manufacturer.

Par la présente, nous déclarons que le dispositif désigné ci-dessus est conforme aux prescriptions de base des directives EU applicables et indiqués en ci que concerne conception, dessin et modèle vendu par nous-mêmes. Cette déclaration cesse d'être valable si des modifications sont apportées au dispositif sans notre autorisation préalable.

Maschinenrichtlinie (mit Änderungen) / Machine directive (with supplements) / Directive Machines (avec des suppléments)

2006/42/EG

Niederspannungsrichtlinie / Low-Voltage Directive / Directive Basse Tension

2006/95/EG

Richtlinie Elektromagnetische Verträglichkeit / Electromagnetic Compatibility Directive / Directive Compatibilité Electromagnétique

2004/108/EG

Angewandte Harmonisierte Normen / Harmonized Standards applied / Normes Harmonisées utilisées
DIN EN 12100-2, DIN EN 61010-1, DIN EN 1012-2, DIN EN 61326-1

Managementsysteme / Management systems / Systèmes de Management

EN ISO 9001, EN ISO 14001 (1997-2006)

Wertheim, 27.05.2009

.....
Ort, Datum / place, date / lieu, date

.....
(Dr. F. Gitmans)

Geschäftsführer / Managing Director / Gérant

ppa.

.....
(Dr. J. Dirscherl)

Technischer Leiter / Technical Director / Directeur technique

VACUUBRAND GMBH + CO KG

-Vakuumtechnik im System-
-Technology for Vacuum Systems-
-Technologie pour système à vide-

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-Technology for Vacuum Systems-

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