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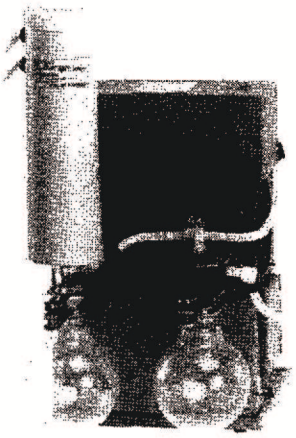
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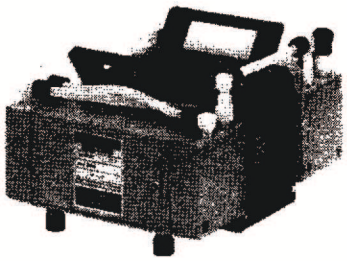
Find the *Vacuubrand MD 4C NT +AK +EK* at our website: *Click HERE*

vacuubrand

Technology for Vacuum Systems

Instructions for use





ME 8C - MZ 4C - MD 4C
MD 4C + AK + EK
MD 4C + AK Synchro + EK

Chemistry diaphragm pumps

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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.

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Contents

Safety information! 4
Technical data 8
Use and operation 12
Accessories - installation 15
Troubleshooting 17
Replacing diaphragms and valves 18
Notes on return to the factory 25
Health and safety clearance form 26



Attention! Important notes!



Not permitted! Misuse may cause damage.



Caution! Hot surface!



Isolate equipment from mains.



Note.

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Safety information!



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.

- **Read and comply with this manual before installing or operating the equipment.**
- Transport the pump at the provided handles.

Use the equipment **for the intended use only** (i.e. for generation of vacuum).

- Prevent any part of the human body from coming in contact with the vacuum.
- Comply with notes on correct vacuum and electrical connections.
- 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 **national safety regulations and safety requirements** concerning the use of vacuum and electrical equipment.

- Equipment must be connected only to a **suitable fused and protected 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.
- **Check that mains voltage and current conform with the equipment (see rating plate).**
- 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).
- Make sure ventilation is adequate if pump is installed in a housing or if ambient temperature is elevated.



Comply with all **relevant safety requirements** (regulations and guidelines) and adopt suitable safety measures.

- 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.
  Attention: Flexible elements tend to shrink when being evacuated.

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

- Comply with **maximum permitted pressures** and pressure differences, see section "Technical data". Do not operate the pump with overpressure at the inlet.



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!**

- Ensure that the system design does not allow the exhaust pipeline to become blocked.
- Avoid overpressure of more than 0.2 bar in case inert gas is connected.
- Ensure that the system design does not allow the coolant outlet pipeline to become blocked.

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☞ Secure coolant hoses at the hose nozzles (e.g. with hose clip) to prevent their accidental slipping.
☞ Check liquid level in both catchpots regularly and drain condensate in time.
☞ Check the overpressure safety relief device at the exhaust waste vapour condenser in appropriate intervals.
☞ The diameter of the inlet and outlet pipeline should be at the least as large as the diameter of the pump connection pipelines.



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, especially directive IEC 1010. This directive 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 dewiness.



Pay attention to symbol "hot surfaces" on the equipment.
☞ Adopt suitable measures to prevent any danger arising from the formation of hot surfaces or electric sparks.



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

If pumping **different substances**, purge the pump with 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 with and the pump material. Ensure that the materials of the wetted parts are compatible with the pumped substances, see section "Technical data".
Take into consideration interactions and chemical reactions of the pumped media.



The pumps are **not suitable** for pumping substances which may form **deposits** inside the pump.
☞ If there is a danger of the formation of **deposits** in the pump chamber (check inlet and outlet of the pump) inspect the pump chamber regularly and clean if necessary.
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.

The pumps are **not suitable** to pump **self inflammable** substances, substances which are inflammable without air and **explosive substances.**
The pumps are **not suitable** for pumping dust and have **no approval** for operation below ground.



Ensure that the materials of the wetted parts are compatible with the pumped substances, see section "Technical data".
☞ Adopt suitable measures to prevent the release of dangerous, explosive, corrosive or polluting fluids.
☞ Use inert gas for gas ballast if necessary.
☞ The user must take suitable precautions to prevent any formation of explosive mixtures in the expansion chamber or at the outlet. In case of a diaphragm crack, mechanically generated sparks, hot surfaces or static electricity may ignite these mixtures.
☞ 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.
☞ Comply with applicable regulations when disposing of chemicals. Take into consideration that chemicals may be polluted.

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The motor is shut down by a **thermal cutout** in the winding.

☞ Attention: Manual reset is necessary. Switch off the pump or isolate the equipment from mains. Wait approx. five minutes before restarting the pump.

☞ **Attention**: In case of **supply voltage below 100V**, the lock of the cutout might be restricted and the pump might restart on its own after sufficient cooling down. Take suitable precautions, if an automatic restart of the pump may lead to a critical dangerous situation.

☞ Avoid high heat supply (e. g. due to hot process gases)

☞ Ensure sufficient air admittance if pump is installed in a housing.

Due to the residual **leak rate of the equipment**, there may 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.

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.



Ensure that in case of failure the pump and the vacuum system always will turn into a safe status.

☞ In case of diaphragm cracks or leaks in the manifold pumped substances might be released into the environment or into the pump housing. To reduce the risk of leaks, ask for a diaphragm pump with additional safety diaphragm.

☞ Comply especially with notes on operation and use and maintenance.

☞ Failure of the pump (e. g. due to power failure) must not lead to a critical dangerous situation under any circumstances. Electronic equipment is never 100% fail-safe. This may lead to an indefinite status of the equipment. Provide protective measures against malfunction and failure.

☞ Operating the pump, stand still of the pump or operating an venting valve must not lead to a critical dangerous situation under any circumstances.

Use only **genuine 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 C/US conformity becomes void if not using genuine spare parts.

Ensure that maintenance is done only by suitable trained and supervised technicians. Ensure that the maintenance technician is familiar with the safety procedures which relate to the product processed by the vacuum system and that the equipment, if necessary, is appropriately decontaminated before starting maintenance.
Comply with local and national safety regulations.

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.

☞ 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** and **wait two minutes** before starting maintenance to allow the capacitors to discharge.

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

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- **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.

- 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.

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.

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Technical data

Type		ME 8C	MZ 4C	MD 4C
Max. pumping speed 50/60 Hz (DIN 28432)	m^3/h	2 x 3.6 / 2 x 4.0	2 x 1.9 / 2 x 2.1	3.0 / 3.5
Ultimate vacuum (absolute)	mbar	< 80	9	2
Ultimate vacuum (absolute) with gas ballast	mbar	-	20	4*
Max. permissible outlet pressure (absolute)	bar	2	2	1.1
Permissible ambient temperature storage / operation	°C	-10 to +60 / +10 to +40		
Permissible relative atmospheric moisture during operation (no condensation)	%	30 to 85		
Power	W	200	200	200 180 (200-208V)
No-load speed 50/60 Hz	min^{-1}	1500/1800		
Rated current at				
100 V~ 50/60 Hz	A	-	-	3.8/4.8
120 V~ 60 Hz	A	4.2	4.2	4.2
200-208 V~ 50/60 Hz	A	-	-	1,9/2,3
230 V~ 50/60 Hz	A	1.9/1.9	1.9/1.9	1.9/1.9
Maximum permissible range of supply voltage. **Attention: Observe specifications of rating plate!**		100 V~ +/-10% 50/60 Hz 120 V~ +5%/-10% 60 Hz 200-208 V~ +/-10% 50/60 Hz 230 V~ +/-10% 50/60 Hz		
Motor protection		thermal cutout		
Degree of protection IEC 529		IP 20		
Number of inlets/outlets		2 / 4	2 / 2	1 /1
Inlet		hose nozzle NW 10		
Outlet		hose nozzle NW 10		
Coolant connections**		hose nozzle NW 6		
Maximum permissible pressure of coolant at waste vapour condenser**	bar	6 (absolute)		
Permissible range of coolant temperature**	°C	-15 to +20		
Dimensions L x W x H	mm	321 x 241 x 178	321 x 241 x 178	321 x 241 x 178
Weight approx.	kg	16.2	16.3	16.2

* Ultimate vacuum (absolute) with gas ballast of pumping units MD 4C + AK+ EK, MD 4C + AK Synchro + EK and MD 4C + 2 AK: 9 mbar

** only pumping units MD 4C + AK+ EK, MD 4C + AK Synchro + EK

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Components	Wetted materials
Pumping unit	
Outlet of exhaust waste vapour condenser	PET
Inlet	ETFE / ECTFE or PP (MD 4C + AK Synchro + EK)
Tubing	PTFE
Fittings	ETFE or ECTFE
O-rings at the catchpot	FPM
Overpressure safety relief device	Silicon rubber / PTFE
Catchpot cover plate	PE
Exhaust waste vapour condenser, round bottom collecting flask	Borsilicate glass; borosilicate glass coated
MD 4C + AK Synchro + EK	
Valve	FFKM
Flow control diaphragm	PTFE
Seal ring	PTFE
Blind plug	PP
Valve blocks	PE
Pump	
Housing cover insert	PTFE carbon reinforced
Head cover	ETFE carbon fibre reinforced
Diaphragm clamping disc	ETFE carbon fibre reinforced
Valve (ME 8C)	PTFE
Valve (MZ 4C / MD 4C)	FFKM
Diaphragm	PTFE
Inlet	ETFE / ECTFE
Outlet	ETFE / ECTFE
Tubing	PTFE
Fittings	ETFE / ECTFE

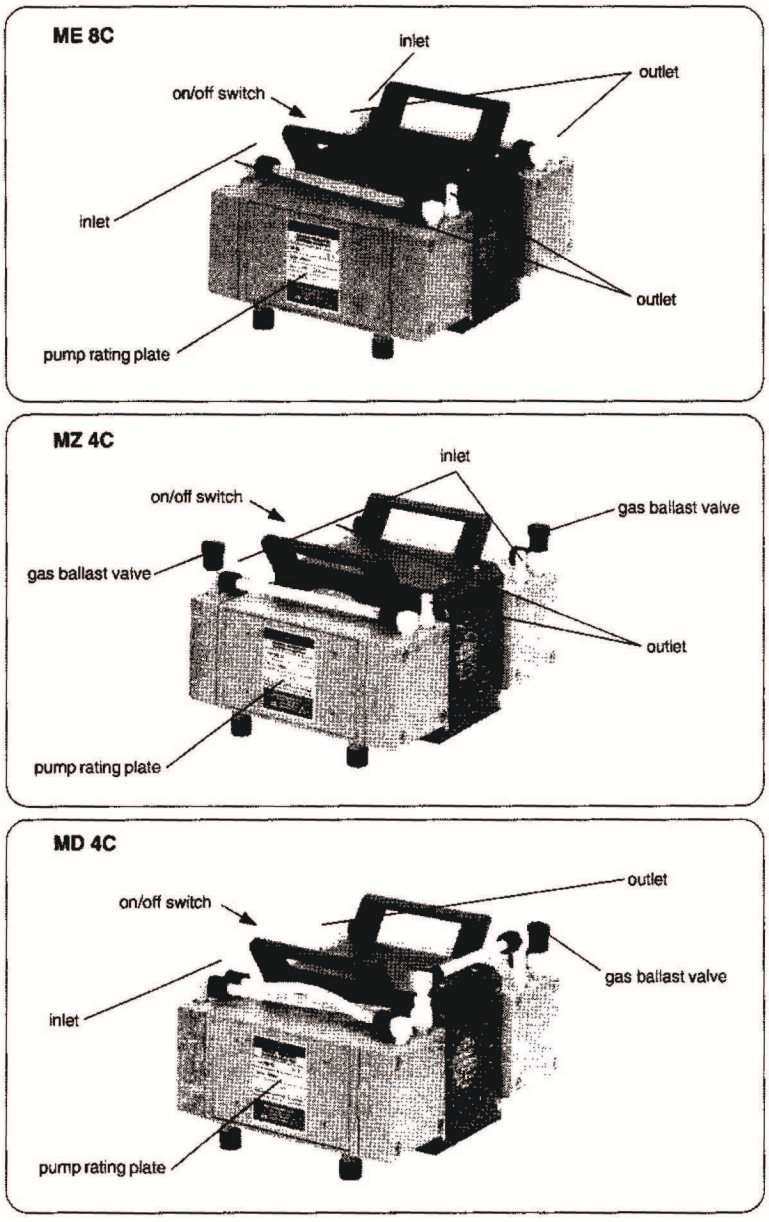
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Gas inlet temperatures:

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 operation (< 5 minutes)	< 100 mbar (low gas load)	➨ -10°C to +80°C

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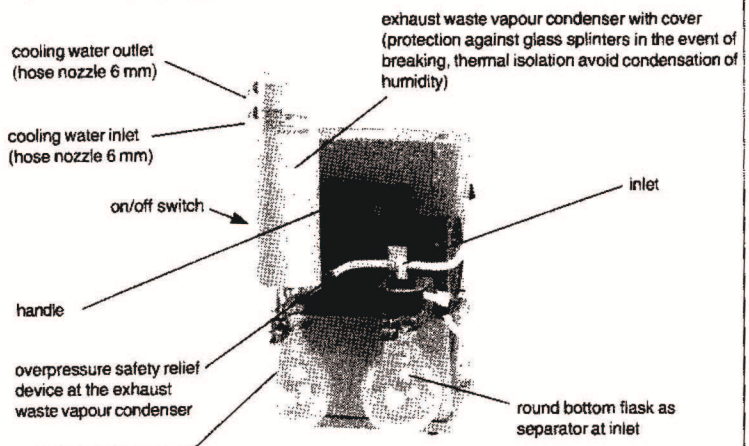
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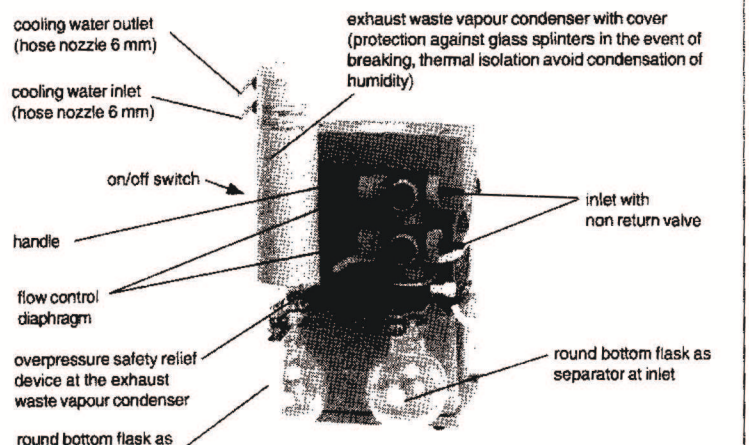
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MD 4C + AK + EK
(mounted to pump support with catchpot at inlet and exhaust waste vapour condenser)



overall dimensions (L x W x H) in mm: 350 x 275 x 495
mass approx.: 19,9 kg

MD 4C + AK Synchro + EK
(mounted to pump support with catchpot at inlet and exhaust waste vapour condenser)



overall dimensions (L x W x H) in mm: 350 x 279 x 495
mass approx.: 20,9 kg

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Use and operation

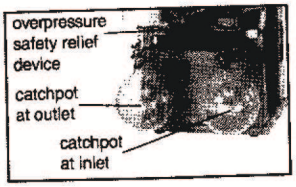
Installing in a vacuum system:

- Avoid throttling losses by using connecting pipes with large diameter and keep them as short as possible.
- Reduce the transmission of vibration and prevent mechanical loading 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.
- Use a suitable valve to isolate the pump from the vacuum system to allow the pump to warm up before condensable vapours are pumped or to clean the pump before it is switched off.
- Connect the exhaust to a suitable treatment plant to prevent the discharge of dangerous gases and vapours to the surrounding atmosphere. Use a catchpot to prevent the drainage of contaminated condensate back into the pump.

Prior to use:

- **Maximum ambient temperature**: 40 °C
- Make sure ventilation is adequate if pump is installed in a housing or if ambient temperature is elevated. Keep a distance of minimum 20 cm between fans and ambient parts.
- If pump is installed in altitudes of more than 1000 m above mean sea level check compatibility with applicable safety requirements, e. g. IEC 60034 (motor may overheat due to insufficient cooling).
- If the gas ballast valve is open, a power failure may cause unintentional ventilation of the pump. In case this constitutes a potential source of danger, take appropriate safety measures.
- When assembling, ensure **vacuum-tightness**. After assembly, check the complete system for leaks.

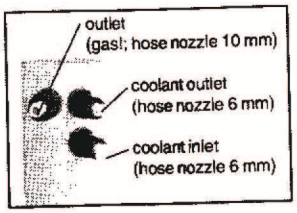
MD 4C + AK + EK / MD 4C + AK Synchro + EK
with separator at the inlet and exhaust waste vapour condenser at the outlet:



Round bottom flasks:
The catchpot at the inlet prevents droplets and particles from entering the pump.
- Lifetimes of diaphragms and valves are enhanced.
- Improves vacuum in case of condensation.

Both round bottom flasks are coated with a protective layer to prevent disintegration in case of breakage or implosion.

- Assemble the catchpots at the inlet and at the outlet using joint clips.



Exhaust waste vapour condenser:
- Assemble hose nozzles for coolant inlet and coolant outlet pipelines at the exhaust waste vapour condenser.

The **exhaust waste vapour condenser** enables an efficient condensation of the pumped vapours at the outlet.
- No backflow of condensates.
- Controlled recovery of condensates.
- Next to 100% solvent recovery.
- The isolation cover protects against glass splinters in case of breaking, acts as thermal isolation to avoid condensation of humidity and is intended to absorb shocks.

- Attach the pipelines of the coolant circuit to the respective hose nozzles (see image) at the waste vapour condenser. Check hose connections prior to starting operation of the cooling system.

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- Secure coolant hoses at the hose nozzles (e.g. with hose clip) to prevent their accidental slipping.
- Ensure that the **coolant outlet pipeline** is always free and that it cannot get blocked.

- The gas outlet (hose nozzle 10 mm) must not be blocked. The exhaust pipeline has always to be free and pressureless to enable an unhindered discharge of gases.
- Connect the exhaust to a suitable treatment plant to prevent the discharge of dangerous gases and vapours to the surrounding atmosphere.

During operation:

Do not start pump if **pressure difference** between inlet and outlet port exceeds **maximum 1 bar**. Attempts to start pump at higher difference may cause blockade and damage of the motor.

- Check compatibility with **maximum permissible pressure** at outlet and **maximum pressure difference** between inlet and outlet ports.

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

The pump achieves its **pumping speed, ultimate total vacuum** and vapour pumping rate only at operating temperature (after approx. 15 minutes).

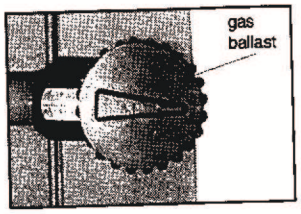
- Prevent internal condensation, transfer of liquids or dust. The diaphragm and valves will be damaged, if liquids are pumped in significant amounts.
- Let the pump run with **gas ballast** to reduce condensation of pumped substances (water vapour, solvents, ...) in the pump.

Motor is shut down by a **thermal cutout** in the winding.

- Manual reset is necessary. Switch off the pump or isolate the equipment from mains. Wait approx. five minutes before restarting the pump. Identify cause of failure and eliminate.
- **Attention**: In case of **supply voltage below 100V**, the lock of the cutout might be restricted and the pump might restart on its own after sufficient cooling down. Take suitable precautions, if an automatic restart of the pump may lead to a critical dangerous situation.

Attention: Important notes regarding the use of gas ballast

- Make sure that air/gas inlet through the gas ballast valve never lead to hazardous, explosive or otherwise dangerous mixtures. If in doubt, use inert gas.
- 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.



For **condensable vapours** (water vapour, solvents, ...):

- Do not pump vapour before pump has reached its operating temperature and with gas ballast valve closed.
- Open gas ballast valve. (Closing of gas ballast valve by turning 180°.)
- The gas ballast valve is open if the arrow on the gas ballast cap shows away from the pump.
- 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.

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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 rates at the exhaust waste vapour condenser.

Attention: Notes concerning the operation of the exhaust waste vapour condenser



- ✒ Check hose connections prior to starting operation of the cooling system.
- ✒ Check coolant hoses regularly during operation.
- ☞ Ensure that the **coolant outlet pipeline** is always free and that it cannot get blocked.

- ☞ Maximum permissible coolant pressure at the exhaust waste vapour condenser: 6 bar (absolute)
- ☞ Comply with the maximum permissible coolant pressures of additional components in the coolant circuit (e.g coolant valve).
- ☞ Avoid overpressure in the coolant circuit (e.g. caused by blocked or squeezed coolant hoses).
- ☞ Permissible range of coolant temperature at the exhaust waste vapour condenser: -15°C to +20°C

- ☞ The gas outlet (hose nozzle 10 mm) must not be blocked. The exhaust pipeline has always to be free and pressureless to enable an unhindered discharge of gases.
- ☞ Connect the exhaust to a suitable treatment plant to prevent the discharge of dangerous gases and vapours to the surrounding atmosphere.



In case of **condensation:**

- ✒ Check liquid level in both catchpots during operation. Avoid overflowing of the catchpots.
- ☞ Do not overfill the catchpots. Maximum liquid level approx. 80%, to avoid problems when removing the catchpots.
- ✒ Check liquid level in both catchpots regularely and drain catchpots in time.

Removing the catchpots:

Catchpot at outlet:

- ✒ Remove joint clip, remove catchpot and drain condensate.

Catchpot at inlet:

- ✒ Admit air or inert gas (via inlet of pumping unit) to atmospheric pressure. Remove joint clip, remove catchpot and drain condensate.

- ✒ Reassemble drained catchpots.

Important: Comply with regulations when disposing solvents/condensates. Reuse if possible, purify if contaminated.



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 forms **deposits**?

☞ Check and clean pump heads if necessary.

Long-term:

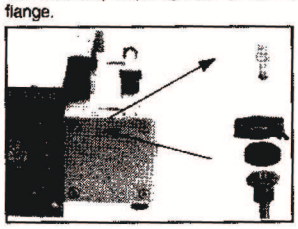
- ✒ Take measures as described in section short-term shutdown.
- ✒ Separate pump from the apparatus.
- ✒ Drain catchpots.
- ✒ Close inlet and outlet port (e. g. with transport caps).
- ✒ Store the pump in dry conditions.

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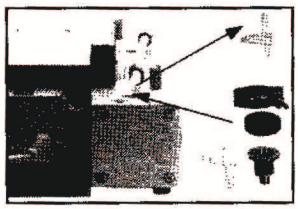
Accessories - installation

The chemistry diaphragm pumps are equipped with a hose nozzle which can easily be replaced by a small flange.



MZ 4C

Small flange NW 16 ..... **69 68 20**
Clamping ring NW 10/16 (aluminium) **66 00 00**
Centring ring NW 10/16 (FPM) **66 01 95**



ME 8C / MD 4C

Small flange NW 16 ..... **63 98 83**
For installation an additional part is required:
Elbow fitting with extension **63 98 51**
Note: Screw in small flange into elbow fitting max. 3 1/2 turns

Clamping ring NW 10/16 (aluminium) **66 00 00**
Centring ring NW 10/16 (FPM) **66 01 95**



Pump support MD 4C (kit) **69 99 24**
Installation of the diaphragm pump in vertical position.
- Space saving.
- Avoiding accumulation of condensate in the pump.

The chemistry diaphragm pumps **MD 4C + AK (Synchro) + EK** are part of the modular Chemistry-Vacuum-System. **Conversion is only possible at the factory!**

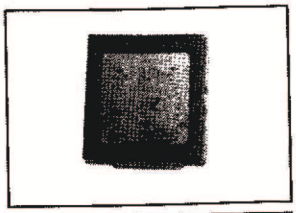


Conversion to pumping unit PC 610:
- One electronically controlled vacuum connection.
- With vacuum controller CVC 2^{II} for optimum control of the vacuum, controller support and solenoid operated venting valve.

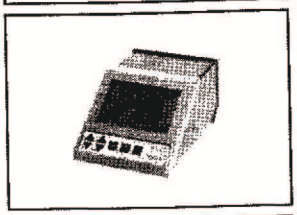
Conversion to pumping unit PC 611:
- Two vacuum connections: one controlled electronically, one controlled manually.
- With vacuum controller CVC 2^{II} for optimum control of the vacuum, controller support, solenoid operated venting valve and manual flow control.

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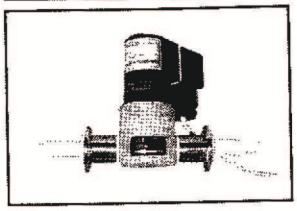


Digital vacuum gauge DVR 2 ..... **68 29 02**



Vacuum controller CVC 2^{n} (230 V, 50/60 Hz)
CEE **68 31 50**
CH **68 31 52**

- Manual or semiautomatic determination of the pressure set value (boiling point).
- Quick and easy vacuum setting and controlling.
- Stand mounting (included).
- Field-tested vacuum controlling in combination with solenoid operated isolation valve VV 6C.



Isolation valve solenoid operated 24V=
VV 6C **67 40 91**
(PVDF/PTFE, small flange NW 16, hose nozzle NW 6/10)

- For use with vacuum controller CVC 2^{n}.

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Troubleshooting

Fault	Possible cause	Remedy
❑ Pump fails to start or stops immediately.	→ Mains not plugged in, electrical supply failure?	☛ Plug in. Check fuse.
	→ Pressure in outlet pipeline too high?	☛ Remove blockade in line, open valve.
	→ Motor overloaded?	☛ Allow motor to cool, identify and eliminate cause of failure. Manual reset necessary. Switch off pump or isolate equipment from mains.
❑ Pump does not achieve ultimate total pressure or normal pumping speed.	→ Centering ring not correctly positioned or leak in the pipeline or vacuum system?	☛ Check pump with a vacuum gauge directly at pump inlet port, check connections and line.
	→ Long narrow line?	☛ Use line with larger diameter, length as short as possible.
	→ Pump has been exposed to condensate?	☛ Run pump at atmospheric pressure for a few minutes.
	→ Deposits have been formed inside the pump?	☛ Clean and inspect pump heads.
	→ Valves or diaphragm damaged?	☛ Replace valves and/or diaphragms.
	→ Outgasing substances or vapour generated in the process?	☛ Check process parameters.
❑ Pump too noisy.	→ Atmospheric or high pressure at inlet port?	☛ Connect hose to pump outlet.
	→ Diaphragm clamping disc loose?	☛ Perform maintenance.
	→ None of above mentioned causes?	☛ Contact local distributor.
❑ Pump seized.		☛ Contact local distributor.



A **service manual** with exploded view drawings, spare part lists and directions for repair is available on request (only in German or English).
☛ The service manual is for trained service people.

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Replacing diaphragms and valves



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 media 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.



☞ 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.



☞ 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.

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

Set of seals (diaphragms, valves) for **ME 8C** ..... **4 x 69 68 13**
Set of seals (diaphragms, valves) for **MZ 4C / MD 4C** **69 68 15**
Face wrench with torque indicator **63 75 80**

☞ **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.



Tools required (metric):

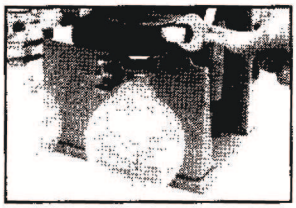
- Phillips screw driver size 2
- Open-ended wrench w/f 10/14/17
- Hex key size 5
- Face wrench with torque indicator

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Disassembling the pump from the pump support

(MD 4C + AK + EK / MD 4C + AK Synchro + EK)



- Use open-ended wrench (w/f 17) to remove union nut on the fitting of the cover plate.



- 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 cover plate.
- Through reassembly a leak may result.

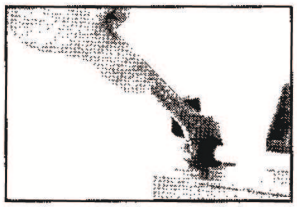


- Remove union nut at the exhaust waste vapour condenser and remove hose from the inlet of the condenser.

- Use open-ended wrench (w/f 10) to remove four nuts on the feet of the pump support and lift off pump together with pump support from the base plate.

- Disassemble pump from pump support. Support pump appropriately.
- Loosen at each case two socket head screws at the rear and the front of the pump with hex key size 5. Pay attention to washers.
- Remove pump from pump support.

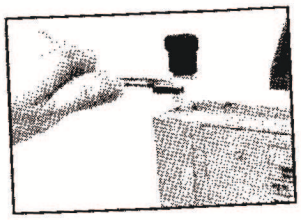
Cleaning and inspecting the pump heads:



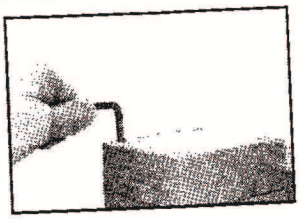
- Use open-ended wrench (w/f 17) to remove union nuts.

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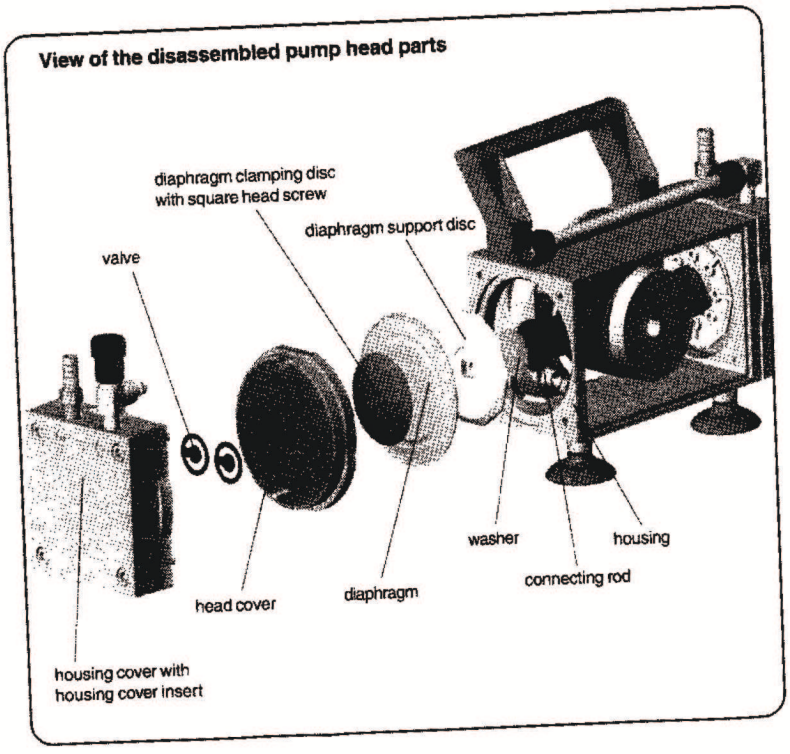


- Use open-ended wrench (w/f 14) to turn elbow fitting 1/4 of a turn, remove hose.
- Do not remove the elbow fitting from the pump head. Through reassembly a leak may result.



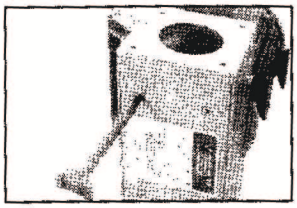
- To check valves use hex key to remove four socket head screws from pump head and remove upper housing (housing cover with housing cover insert), head cover and valves.
- Never remove parts by using a spiky or sharp-edged tool (e.g. screw driver), we recommend to use a rubber mallet or compressed air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

View of the disassembled pump head parts



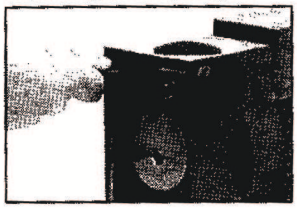
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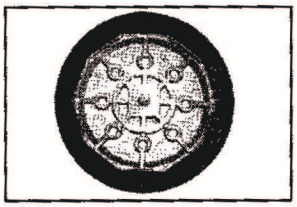


- Check diaphragm for damage and replace if necessary.
- To do so use Phillips screw driver to remove four countersunk head screws and lift off housing plate with rating plate.
- Use petroleum ether or industrial solvent to remove deposits if necessary. Do not inhale.

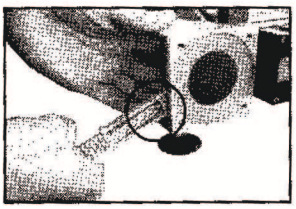
Replacing the diaphragm:



- Use a face wrench to remove diaphragm support disc.
- Check for washers under support disc. Do not mix the washers from the different heads. Make sure that the original number is reassembled at the individual pump head.
- Smaller number of washers: The pump will not attain ultimate vacuum. More 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.
- Make sure that the square head screw of the diaphragm clamping disc is correctly seated in the guide hole of the diaphragm support disc.
- **Note:** Position diaphragm with white PTFE side to diaphragm clamping disc (to pump chamber).



- Use **face wrench with torque indicator** (recommended: **face wrench with torque indicator from VACUUBRAND, Cat.-No.: 63 75 80**) to assemble diaphragm clamping disc, diaphragm and diaphragm support disc (and eventually washers) to the connecting rod.
- Make sure that the square head screw of the diaphragm clamping disc is correctly seated in the guide hole of the diaphragm support disc.

Optimum torque for the diaphragm support disc: **6 Nm.**

- The optimum torque is achieved if the pointer in the handle of the VACUUBRAND face wrench shows to the longer marking line.

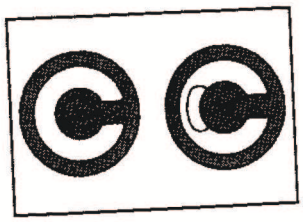
Assembling pump heads:



- By turning eccentric bushing (front of connecting rod), bring connecting rod into a position in which diaphragm is in contact with housing and centred with respect to bore.

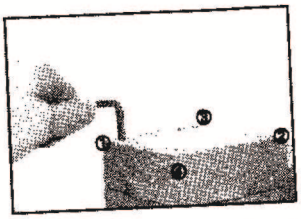
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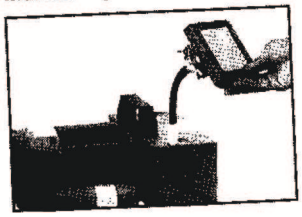
Reassemble in reverse order.

- Install head cover, 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.
- By turning eccentric bushing, bring connecting rod into upper turning point position (Max. stroke of the rod).
- 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 housing cover crosswise (e. g. in the sequence ①, ②, ③, ④) first slightly, then tighten.
- Do not tighten until head cover is in contact with housing, torque **12 Nm**.

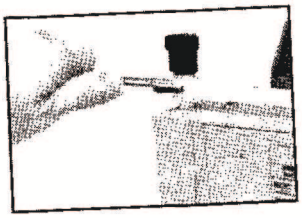
Individual performance check of a pump head:



By measuring the pressure at the inlet port of the individual head:
Use a suitable vacuum gauge (e. g. DVR 2, cat. no.: 68 29 02), 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).

Assembling fittings:



- Use open ended wrench (w/f 14) to reconnect hose to elbow fitting.



- Tighten union nuts first by hand and then tighten one full turn using open ended wrench (w/f 17).

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If the pump does not achieve the ultimate pressure:

☞ 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.

If all pump heads achieve a vacuum below 120 mbar but pump does not achieve the ultimate total pressure:
Check hose connectors between pump heads and manifolds for leaks. If necessary recheck pump chamber. If necessary disassemble fittings again and screw in the elbow fittings another turn, use PTFE sealing bond as necessary.

Assembling the pump at the pump support and on the base plate

(MD 4C + AK + EK / MD 4C + AK Synchro + EK)

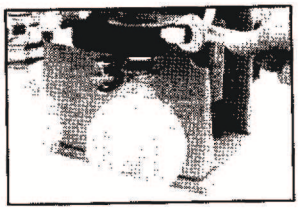
- Assemble pump at pump support. Support pump appropriately.
- Screw in at each case two socket head screws at the rear and the front of the pump with hex key size 5. Pay attention to washers.
- Position pump with pump support on the base plate and tighten the four hexagon nuts on the feet of the pump support with an open-ended wrench w/f 10.



- Reconnect hose to the inlet of the condenser and tighten union nut.



- Use open-ended wrench to reconnect hose to elbow fitting.



- Tighten union nut first by hand and then tighten by one full turn using open-ended wrench.

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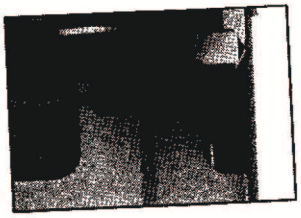
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Cleaning and assembling components



Overpressure safety relief device **63 88 21**
(at the exhaust waste vapour condenser)

- Remove union nut at the condenser and remove hose from the inlet of the condenser.
- Pull off old overpressure safety relief device and install new one.
- Connect hose to the inlet of the exhaust waste vapour condenser and tighten union nut.



Round bottom flask 500 ml, coated **63 84 97**

O-ring 28 x 2,5 (FPM) **3 12 05 53**
alternatively
O-ring 28 x 2,5 (FEP) **63 83 04**
at the spherical ground joint of the round bottom flask at the inlet

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Notes on return to the factory

Repair - return - DKD calibration



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 complied with.



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.
Before returning the equipment ensure that (if applicable):



- ☞ Oil has been drained and an adequate quantity of fresh oil has been filled in to protect against corrosion.
- ☞ 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.**

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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 send 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.**

a) 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**).
b) inevitably, the repair process will be delayed considerably, if this information is missing or this procedure is not complied with. We hope for your understanding for these measures which are beyond our control and that you will assist us in expediting the repair procedure.
c) **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.**

1. Product (Model): .....

2. Serial No.: .....

3. List of substances in contact with the equipment or reaction products:

3.1 Chemical/substance name, chemical symbol:

a) .....

b) .....

c) .....

d) .....

3.2 Important informations and precautions, e. g. danger classification:

a) .....

b) .....

c) .....

d) .....

4. Declaration (please mark as applicable):

☐ **4.1 for non dangerous goods:**

We assure for the returned product that
- 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.

☐ **4.2 for dangerous goods:**

We assure for the returned product that
- all substances, toxic, corrosive, biologically active, explosive, radioactive or dangerous in any way which have 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 ☐ cleaned ☐ decontaminated ☐ sterilized.

5. Way of transport / carrier:

.....

Day of dispatch to VACUUBRAND:

.....

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"):
☐ yes ☐ no

We declare that the following measures - where applicable - have been taken:
- 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).

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.

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.

Signature: .....

Name (print): .....

Job title (print): .....

Company's seal: .....

Date: .....

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CE

Konformitätserklärung
Declaration of conformity
Déclaration de conformité

Membranpumpe / Diaphragm pump / Pompe à membrane

ME 8C (69 61 81, 69 61 82, 69 61 85) 230V
MZ 4C (69 62 81, 69 63 71, 69 63 72) 230V
MD 4C (69 62 92, 69 63 78, 69 63 79) 230V
MD 4C + AK + EK (68 80 27, 68 80 96, 68 80 98) 230V
MD 4C + AK Synchro + EK (68 80 30, 68 81 32, 68 81 33) 230V

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 conceme 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)
98/37/EG
Niederspannungsrichtlinie / Low-Voltage Directive / Directive Basse Tension
2006/95/EG
Richtlinie Elektromagnetische Verträglichkeit / Electromagnetic Compatibility Directive / Directive Compatibilité Electromagnétique
89/336/EWG, 92/31/EWG, 93/68/EWG
Angewandte Harmonisierte Normen / Harmonized Standards applied / Normes Harmonisées utilisées
DIN EN 12100-2, DIN EN 61010-1, DIN EN 1012-2, DIN EN 61326
Managementsysteme / Management systems / Systèmes de Management
EN ISO 9001, EN ISO 14001 (1997-2006)

Wertheim, 20.03.2007
Ort, Datum / place, date / lieu, date

Dr. Lachenmann
(Dr. R. Lachenmann)
Geschäftsführer / Managing director / Gérant

VACUUBRAND GMBH + CO KG
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-Technology for Vacuum Systems-
-Technologie pour système à vide-

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vacuubrand

Dr. Bu

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