vacuubrand

TECHNOLOGY FOR VACUUM SYSTEMS

Instructions for use

ME 2C - ME 4C - MZ 2C
MZ 2C + 2 AK - MZ 2C + AK + EK
MZ 2C + AK Synchro + EK

Chemistry diaphragm pumps

Technische Beratung	Gebiet Nord:	Telefon: 09342/808-264
	Gebiet Mitte:	Telefon: 09342/808-263
	Gebiet Süd:	Telefon: 09342/808-225
Kundendienst und Service:		Telefon: 09342/808-209

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

Attention! Important notes!

Not permitted! Misuse may cause damage.

Caution! Hot surface!

Isolate equipment from mains.

Note.

Contents

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 them, 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 obey 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.
- ☞ Obey 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.

Obey **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).
- ☞ Ensure that the pump motor rotates in the correct direction. If it does not, the pump and the vacuum system become pressurised, the system may burst.
- ☞ 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.

Obey 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 evacuated is mechanically stable and that all fittings are secure.
  Attention: Flexible elements tend to shrink when 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.

- ☞ Obey **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.
- ☞ Ensure that the system design does not allow the coolant outlet pipeline to become blocked.

☞ Check the overpressure safety relief device at the exhaust waste vapour condenser in appropriate intervals.
☞ Avoid overpressure of more than 0.2 bar in case inert gas is connected.
☞ 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.

Adopt suitable measures to prevent dangers arising from **dangerous or explosive gases** and dangers arising from the formation of **explosive fluids or explosive or flammable mixtures** and ensure that the materials of the wetted parts are compatible, 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. 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.
☞ Obey applicable regulations when disposing of chemicals. Take into consideration that chemicals may be polluted.

The 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.
☞ 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 turn always into a safe status.
☞ In case of leaks in the manifold pumped substances may leak into the environment or in the pump housing or the motor.
☞ Obey especially all notes on use and operation and on maintenance.
☞ Failure of the pump (e. g. due to power failure) 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.

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 product processed by the vacuum system and that the equipment, if necessary, is appropriately decontaminated before starting maintenance.
Obey local and national safety regulations.
Before starting maintenance vent the system, isolate the pump and other components from the vacuum system and the electrical supply, drain condensate and allow sufficient cooling of the pump.
Before starting maintenance, wait two minutes after isolating the equipment from mains to allow the capacitors to discharge.

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

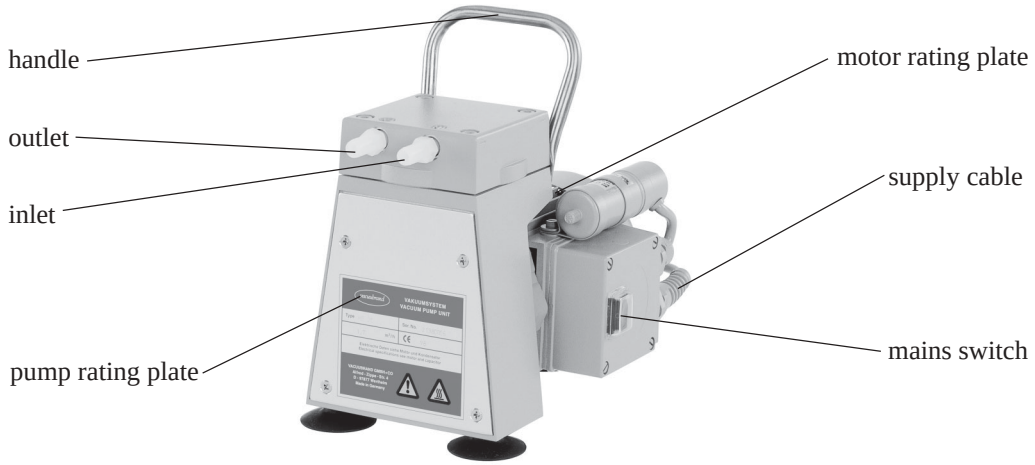
Type		ME 2C	ME 4C	MZ 2C
Max. pumping speed 50/60 Hz (DIN 28432)	m^3/h	1.7/2.0	3.4/3.9	1.7/2.0
Max. pumping speed 60 Hz	cfm	1.2	2.3	1.2
Ultimate (total) vacuum (absolute)	mbar	< 80	< 80	9
Ultimate (total) vacuum (absolute) with gas ballast	mbar	-	-	15
Max. permitted outlet pressure (absolute)	bar	2	2	2
Max. pressure difference between inlet and outlet	bar	1.1	1.1	1.1
Permitted ambient temperature storage / operation	°C	-10 to +60 / +10 to +40		
Permitted relative atmospheric moisture during operation, no condensation	%	30 to 85		
Max. rated input current / motor power				
100 V~	A/W	2.5/120	3.4/180	3.4/180
120 V~	A/W	2.1/120	3.0/180	3.0/180
230 V~	A/W	1.1/120	1.6/180	1.6/180
400 V~ Mot. EEx e II	A/W	-	0.59/180	0.59/180
Max. power draw				
100 V~	VA	250	340	340
120 V~	VA	250	360	360
230 V~	VA	250	370	370
400 V~ Mot. EEx e II	VA	-	410	410
Max. permitted range of supply voltage		100 V~ +10%/-10% 50/60 Hz 120 V~ +5%/-10% 60 Hz 230 V~ +10%/-10% 50/60 Hz 400 V~ +5%/-5% 50 Hz Mot. EEx e II		
Rated speed	min^{-1}	1500/1800		
Motor protection		thermal cutout		
Degree of protection IEC 529		IP 54		
Measuring surface sound pressure level (enveloping surface method; distance 1m)	dBA	48	46	42
Inlet / outlet		hose nozzle ID 10 NPT 1/8-27		
Overall dimensions L x W x H	mm	258 x 173 x 178	266 x 241 x 170	266 x 241 x 170
Mass	kg	6.6	10.5	10.5

Components	Wetted parts
Housing cover insert	PTFE carbon reinforced
Head cover	ETFE
Diaphragm clamping disc	ETFE
Valve	ME 2C/ME 4C: PTFE / MZ 2C: FFKM (e. g. Kalrez®*)
Diaphragm	PTFE-NBR (e. g. Perbunan®**) sandwich
Inlet / outlet / fittings	ETFE
Hose	PTFE

* reg. trade mark Du Pont
** reg. trade mark Bayer AG

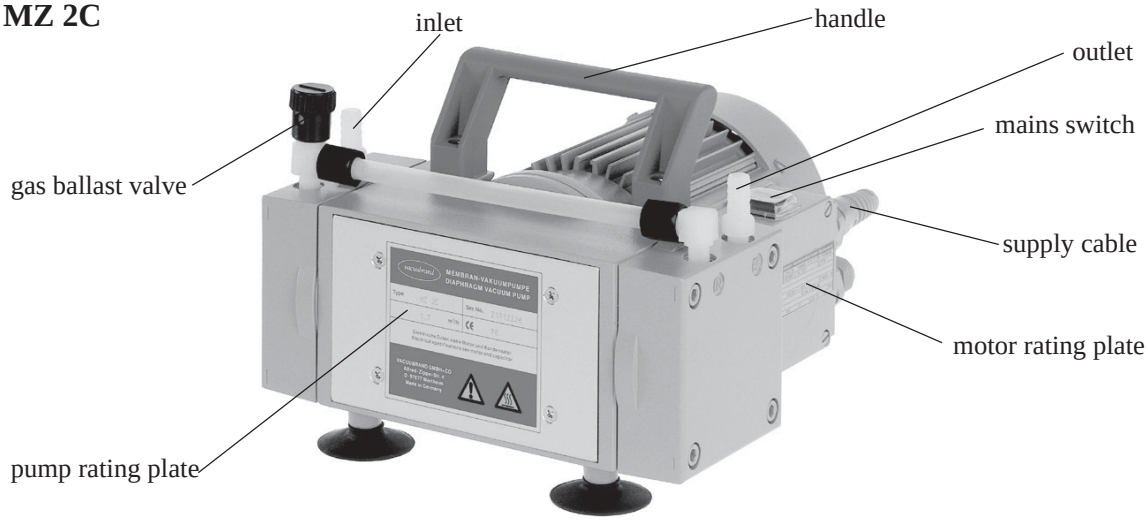
We reserve the right for technical modification without prior notice!

ME 2C

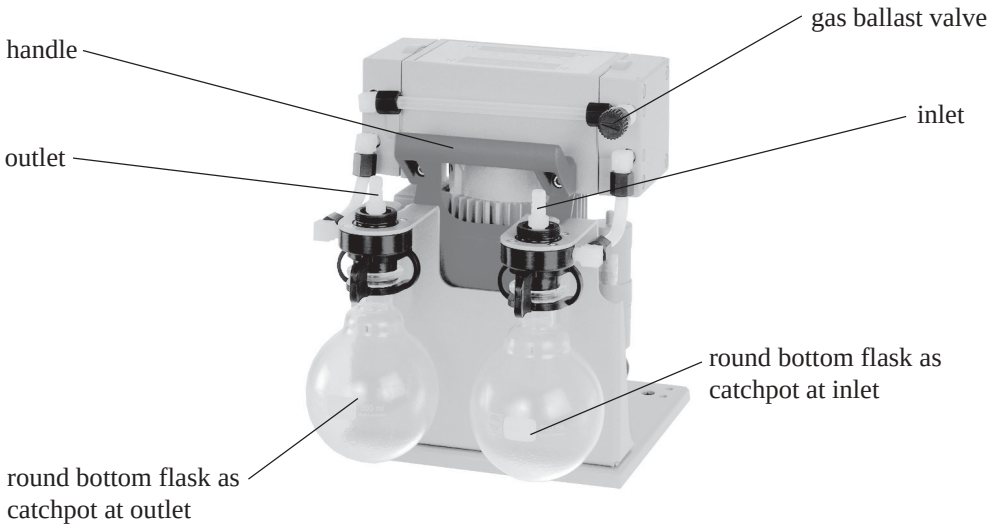


ME 4C

MZ 2C

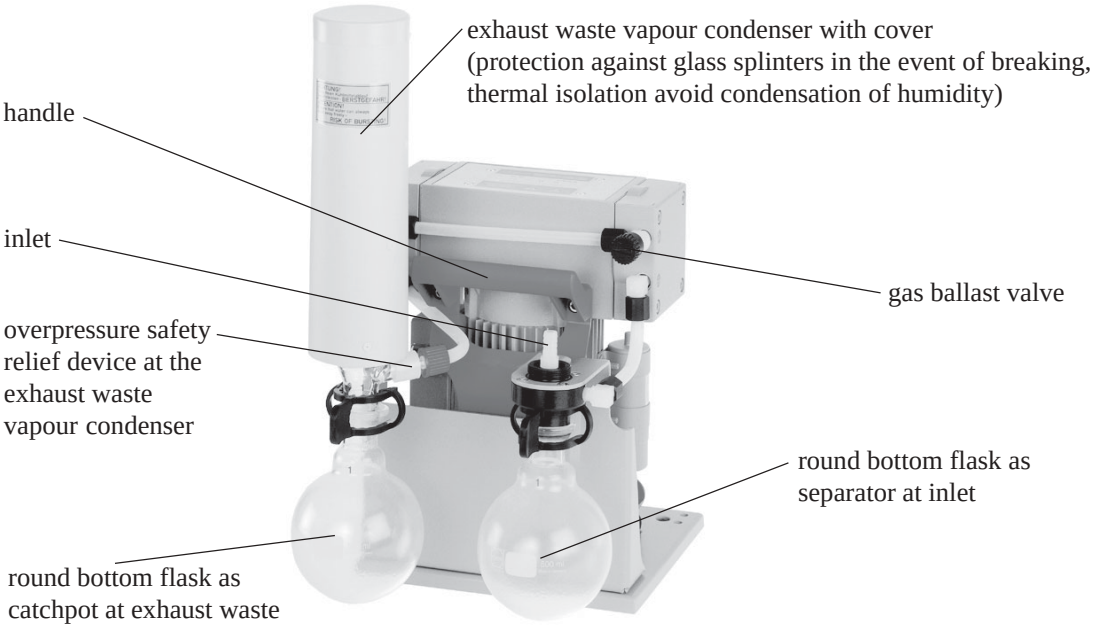


MZ 2C + 2 AK
(mounted to pump support with catchpot at inlet and outlet)



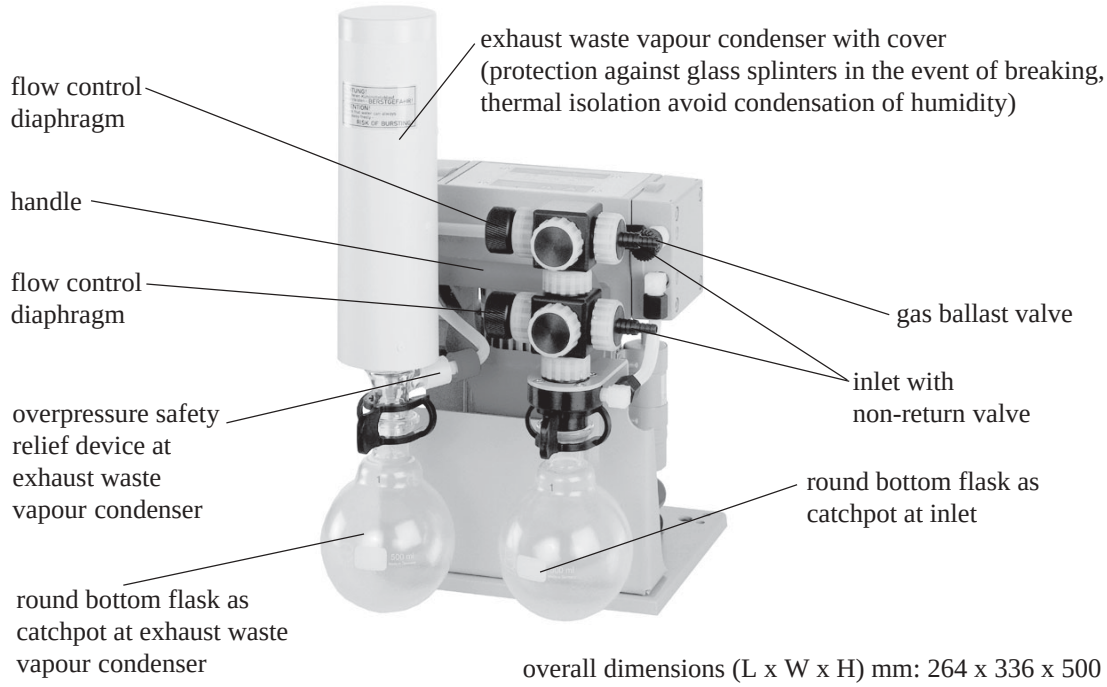
overall dimensions (L x W x H) mm: 241 x 336 x 326
mass: approx. 12.9 kg

MZ 2C + AK + EK
(mounted to pump support with catchpot at inlet and exhaust waste vapour condenser)



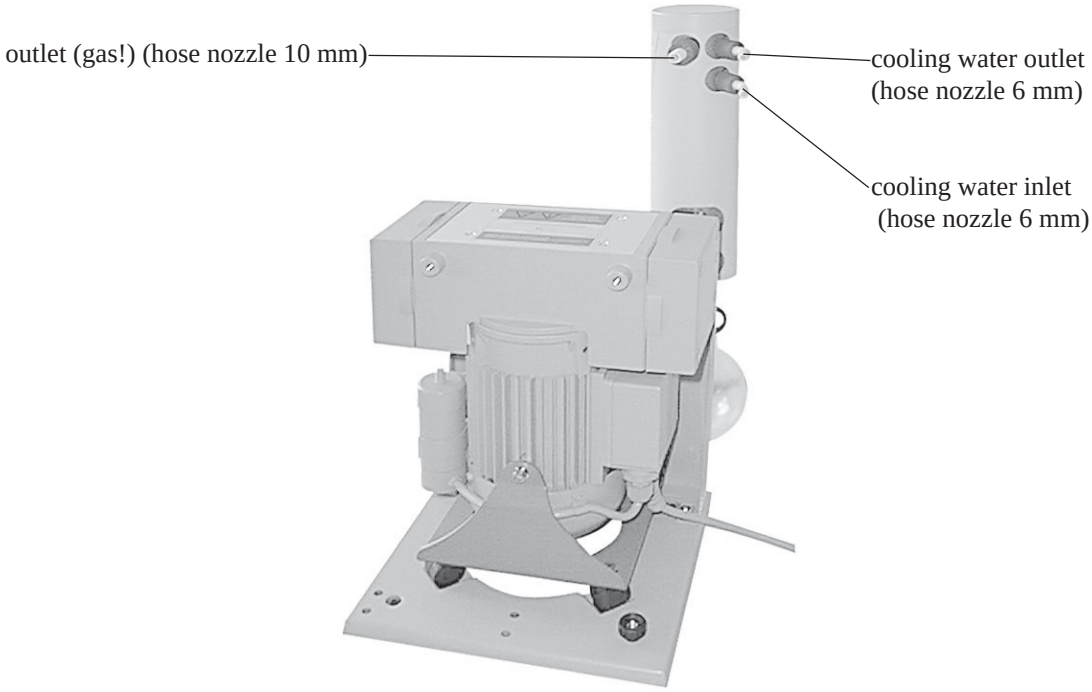
overall dimensions (L x W x H) mm: 241 x 336 x 500
mass: approx. 13.4 kg

MZ 2C + AK Synchro + EK
(mounted to pump support with catchpot at inlet and exhaust waste vapour condenser)



overall dimensions (L x W x H) mm: 264 x 336 x 500
mass: approx. 13.7 kg

Rear side MZ 2C + AK + EK / MZ 2C + AK Synchro + EK



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 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 surounding atmosphere. Use a catchpot to prevent the drainage of contaminated condensate back into the pump.

Prior to use:

- ☞ **Max. 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 min. 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. DIN VDE 0530 (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.
- ☞ **Check direction of rotation of the motor (three phase motor only):** Watch the fan through the fan cover. Let the pump run for a few seconds and check if the fan rotates in the indicated direction. If the direction of rotation is not correct, switch off the pump immediately. Contact your local distributor for further information.
- ☞ When assembling, ensure **vacuum-tightness**. After assembly, check the complete system for leaks.

During operation:

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

- ☞ Check compatibility with **max. permitted pressure** at outlet and **max. 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).

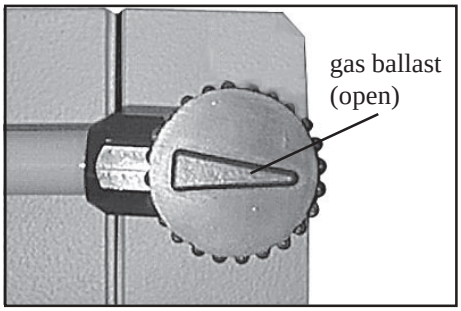
- ☞ Prevent internal condensation, transfer of liquids or dust. The diaphragm and valves will be damaged, if liquids are pumped in significant amounts.
- ☞ Let the pump run with **gas ballast** to reduce condensation of pumped substances (water vapour, solvents, ...) in the pump.

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.

Attention: Important notes regarding the use of gas ballast

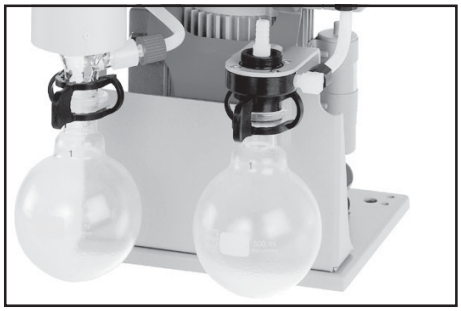
- ☞ Make sure that air/gas inlet through the gas ballast valve never lead to hazardous, explosive or otherwise dangerous mixtures. If in doubt, use inert gas.
- ☞ When using air rather than inert gas, risk of significant damage to equipment and/or facilities, risk of personal injury or even loss of life 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.



MZ 2C / MZ 2C + 2 AK / MZ 2C +AK + EK /
MZ 2C + AK Synchro + EK

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

- ☞ Open gas ballast valve (see fig.) if conditions (pump temperature, solvent) are likely for the formation of condensate. Turn cap to close valve.
- ☞ Attention: With gas ballast valve open, ultimate vacuum will be reduced, pumping speed is decreased.
- ☞ Do not pump any vapour before the pump has reached its operating temperature.
- ☞ Post operate, pump with gas ballast after finishing the process in order to purge the pump.



Separation of condensate:

- ☞ Use condensate separator (catchpot); no draining of condensate into the pump, recovery of condensate.

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

Check level of condensate in both flasks in appropriate intervals:

- ☞ Catchpot at exhaust: remove joint clip, remove flask and drain condensate.
- ☞ Catchpot at inlet: isolate or shut down pump; admit air or inert gas to atmospheric pressure, remove joint clip, remove flask and drain condensate.

Important: Obey regulations when disposing solvents. 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 with gas ballast valve open for a few minutes.

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

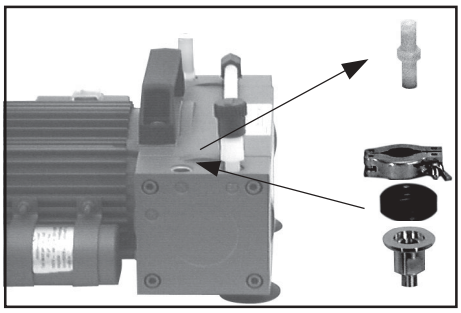
- ☞ Check and clean pump heads if necessary.

Long-term:

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

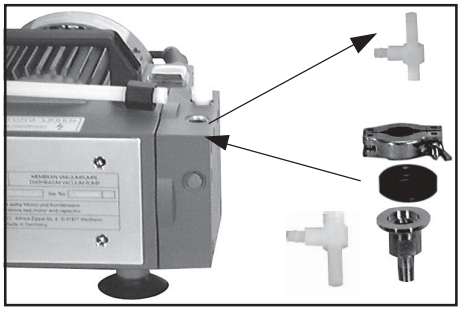
Accessories - installation

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



ME 2C / MZ 2C

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**

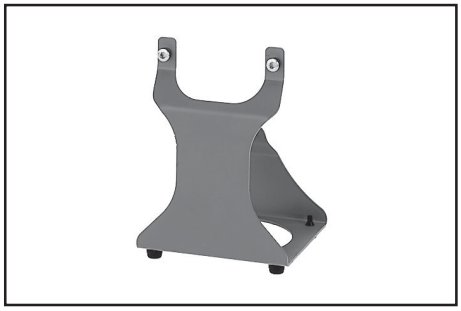


ME 4C

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 revolutions.

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

The chemistry diaphragm pump **MZ 2C** is part of the modular Chemistry-Vacuum-System. All components can be ordered and assembled step by step to units allowing next to 100% solvent recovery and preventing solvent vapours from been emitted.



Pump support MZ 2C (kit) **69 99 25**
(Installation of the diaphragm pump in vertical position.)
☞ Space saving.
☞ Avoiding accumulation of condensate in the pump.

The pump support is necessary also for assembling the retrofit kits 69 99 27 and 69 99 26.

Retrofit kit catchpots 2 AK for MZ 2C **69 99 27**
(Baseplate with inlet and outlet catchpots.)

The catchpot at the inlet prevents condensates from entering the pump.
☞ Lifetime of diaphragms and valves is enhanced.
☞ Improves vacuum in case of liquids entering the pump.

The catchpot at the outlet protects pump and environment.
☞ No draining of condensate into the pump.
☞ Recovery of condensates.

Retrofit kit catchpot and exhaust waste vapour condenser AK + EK for MZ 2C **69 99 26**
(Baseplate with catchpot at inlet and exhaust waste vapour condenser.)

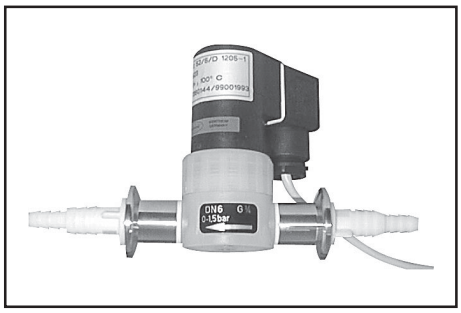
Exhaust waste vapour condenser enables the easy and efficient condensation of vapours under atmospheric pressure.
☞ Next to 100% solvent recovery.
Retrofit kit MZ 2C + AK + EK to MZ 2C + AK Synchro + EK **68 80 36**

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

Vacuum controller CVC 2^{II}
CEE (230 V, 50/60 Hz) **68 31 50**
CH (230 V, 50/60 Hz) **68 31 52**
UK (230 V, 50/60 Hz) **68 31 51**
US (100-120 V, 50/60 Hz) **68 31 53**

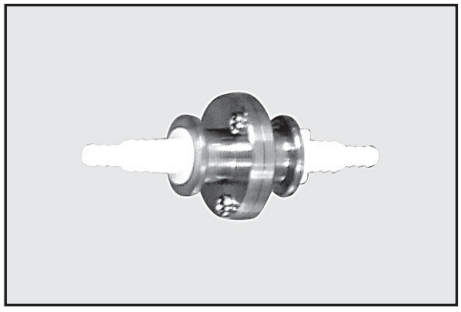
- ☞ Manual or semiautomatic determination of the pressure set value (boiling point).
- ☞ Quick and easy vacuum setting and controlling.
- ☞ Stand mounting (included).

Support extension **63 84 91**
(Assembly onto controller support.)
Extension for mounting a second controller to operate two separate vacuum systems.



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^{II}.



Non return valve (flapper valve) **63 96 83**
(Simultaneous operation of two systems at different pressure levels, stainless steel/FFKM, leak rate < 10^{-3} mbar x l/s for pressure differences ≥ 500 mbar.)

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 cause of failure.
❑ Pump does not achieve ultimate total pressure or normal pumping speed.	➔ Centring 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.

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 the diaphragms are wear parts. If the rated ultimate vacuum is no longer achieved, the pump interior, the diaphragms and the valves must be cleaned and the diaphragms and valves must be checked for cracks or other damage.
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 > 8000 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.

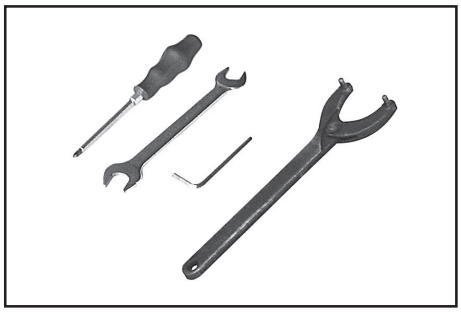
☞ Regular maintenance will improve the lifetime of the pump and also protect both man and environment.

Before starting maintenance, isolate the pump and other components from the vacuum system and the electrical supply so that they cannot be operated accidentally.
Ensure that the maintenance technician is familiar with the safety procedures which relate to the products processed by the pumping system.

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.

☞ Wear appropriate safety-clothing when you come in contact with contaminated components.

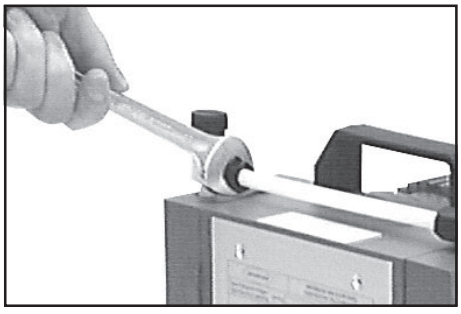
Set of seals (diaphragm and valves) for ME 2C 69 68 13
Set of seals (diaphragms and valves) for ME 4C ..... 2 x 69 68 13
Set of seals (diaphragms and valves) for MZ 2C 69 68 14



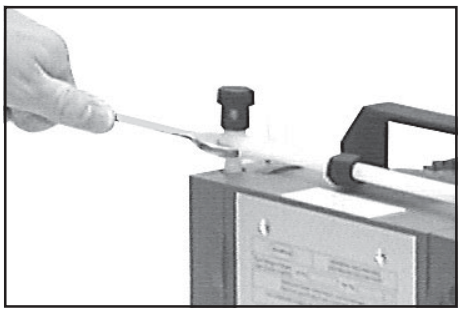
Tools required (metric):

- Phillips screw driver size 2
- Open-ended wrench w/f 15/17
- Hex key w/f 5
- Face wrench with universal joint size 40/4

Cleaning and inspecting the pump heads:



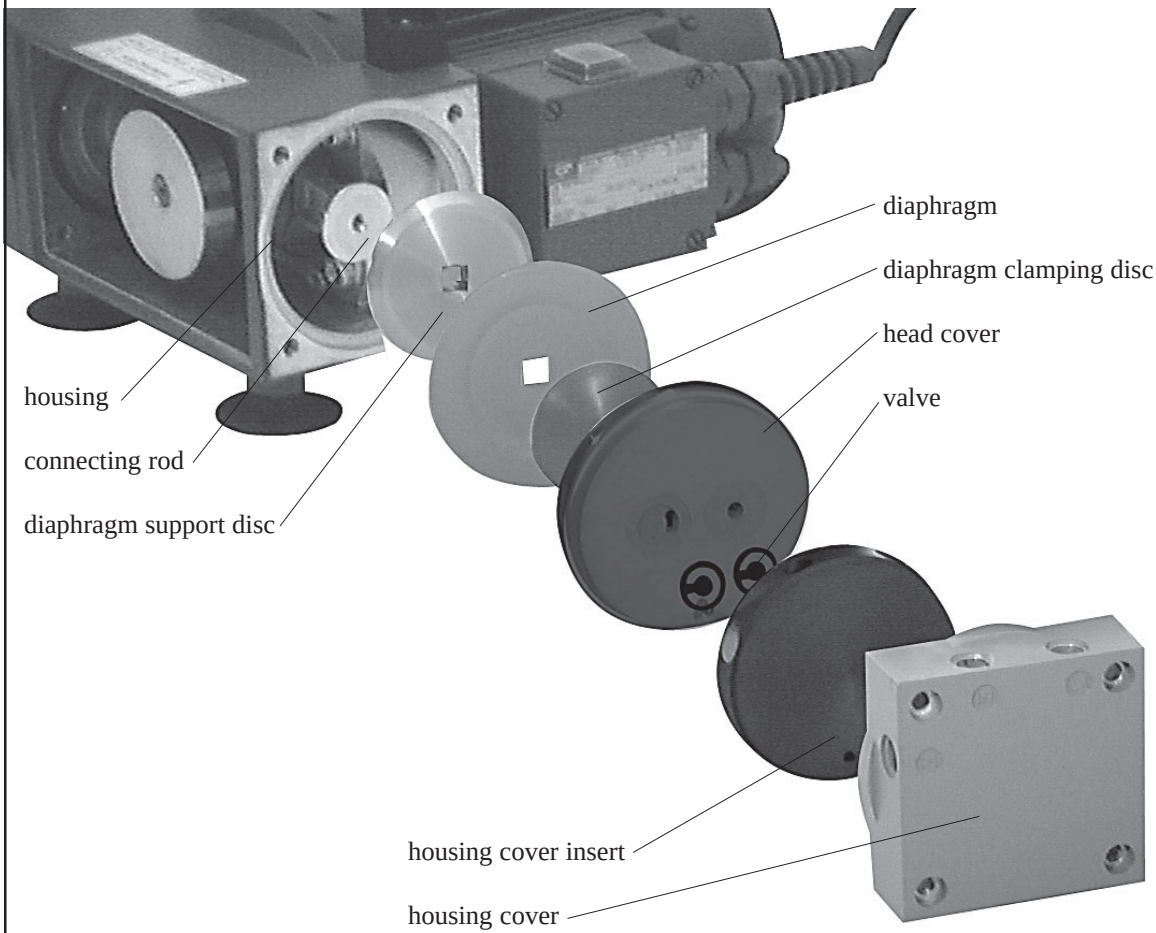
Use open-ended wrench to remove union nuts.

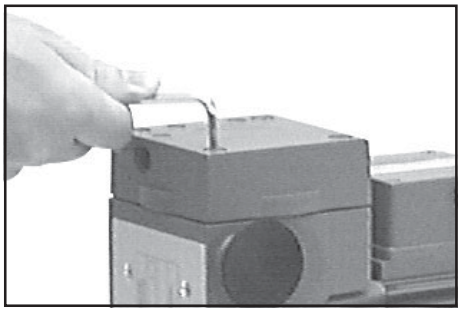


Use open ended wrench to turn elbow fitting 1/4 of a turn, reconnect hose. Do not remove the elbow fitting from the pump head.

☞ Through reassembly a leak may result.

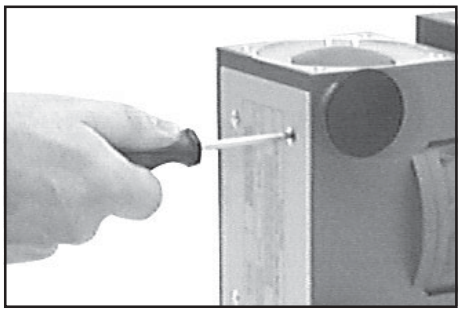
View of the disassembled pump head parts





Use hex key to remove four socket head screws from pump head and remove upper housing (housing cover with housing cover insert and head cover).

☞ 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).



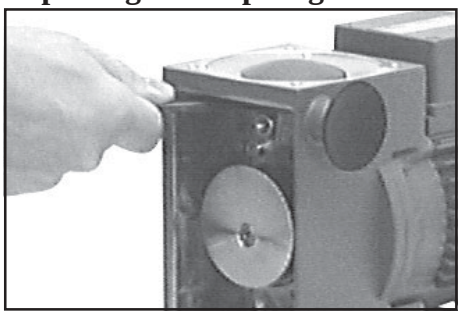
Remove head cover from housing cover insert and check valves. Note position of valves and remove.

☞ Replace valves if necessary.

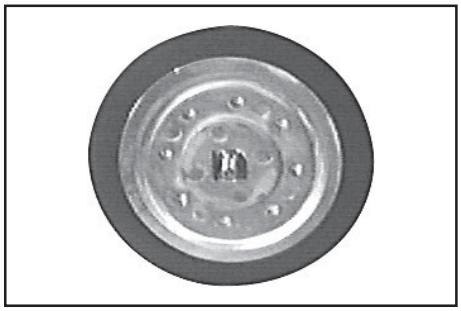
Use petroleum ether or industrial solvent to remove deposits. Do not inhale.

Check diaphragm for damage and replace if necessary. Use Phillips screw driver to remove four countersunk head screws and lift off housing plate.

Replacing the diaphragm:



Use face wrench with universal joint to remove diaphragm support disc.



Check for washers under clamping 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 final vacuum. More washers: Clamping disc will hit head cover; noise or even blockage of the pump.

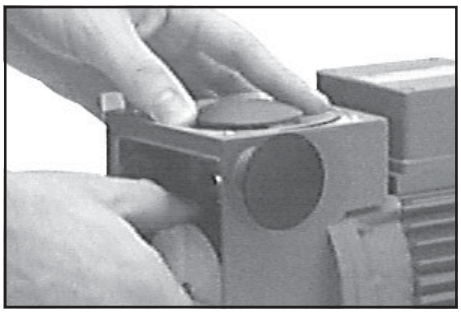
Position new diaphragm between diaphragm clamping disc with square head screw and diaphragm support disc.

☞ **Note:** Position diaphragm with white PTFE side to diaphragm clamping disc (to pump chamber).

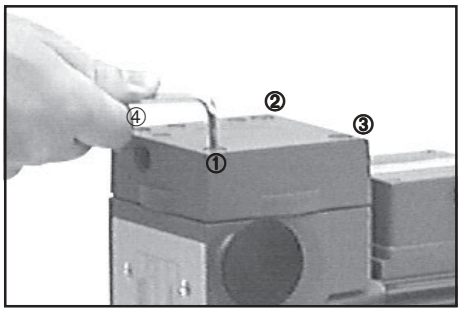
Assemble diaphragm clamping disc, diaphragm and diaphragm support disc to connecting rod.

☞ Make sure that the square head screw of the diaphragm clamping disc is correctly seated in the guide hole of the diaphragm support disc.

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.



Reassemble in reverse order.

Install head cover, valves and housing cover insert with housing cover.

☞ Make sure that the valves are correctly seated.

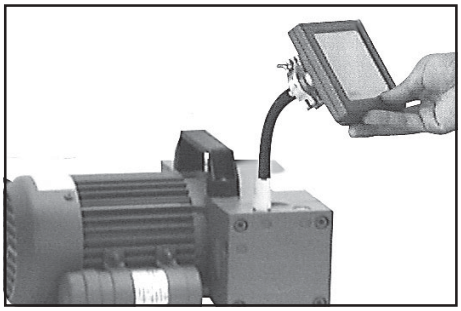
By turning eccentric bushing, bring connecting rod into upper turning point position.

☞ Max. stroke of the rod.

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, max. torque 10 Nm.

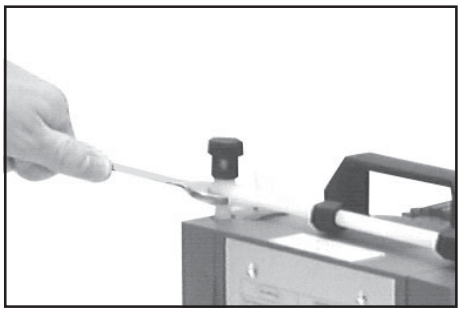
Individual performance check of a pump head :



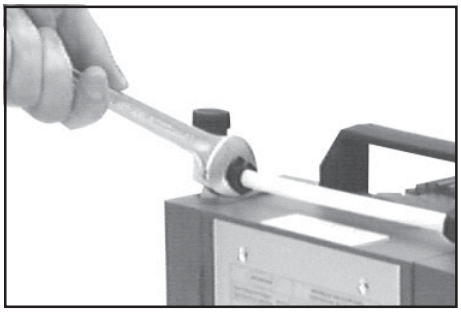
By measuring the pressure at the inlet port of the individual head: Use a suitable vacuum gauge (e. g. DVR 2, cat. no.: 68 29 02), make sure that it is correctly calibrated, and measure the pressure at the inlet port. A vacuum of less than 90 mbar should be indicated.

☞ 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 to reconnect hose to elbow fitting.



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

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 90 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.

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 send 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.

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.**

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 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.
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: .....

VACUUBRAND GMBH + CO KG
-Technology for vacuum systems-

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