



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



LAB Online Exhibition



Dear customer,

Your VACUUBRAND diaphragm pumps should support you for many years without trouble and with optimal performance. Thanks to our long practical experience we have much information and advice how you can achieve powerful application and personal safety through our products. 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 design and 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 faults, even those 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 are committed to providing our customers with this high quality standard.

We know that the vacuum pump can not replace all 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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Attention! Important notes!



Not permitted! Misuse may cause damage.



Caution! Hot surface!



Isolate equipment from mains.



Note.

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

☞ Transport the pump at the provided handle.

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):**



Pumps with **dual-voltage motor (100-120 V / 200-230 V; 50/60 Hz):**

☞ The equipment must be connected to a **suitable fused and protected electrical supply** and a suitable earth point only, provide slow-blow fuse according to voltage supply (see "Technical data").

☞ Check that the voltage changeover switch is positioned correctly.

Attention: If the pump is switched on with the voltage not correctly selected, the motor may be damaged!

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



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.

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.



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 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.
- ☞ Comply especially with 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. Possibly the CE mark or the C/US conformity becomes void if not using genuine spare parts.

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.

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.



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
Pumping speed 50/60 Hz (DIN 28432)	m ³ /h	1.9/2.2 (max.)	3.6/4.0 (max.)	1.9/2.1
Ultimate vacuum (absolute)	mbar	< 80	< 80	9
Ultimate vacuum (absolute) with gas ballast	mbar	-	-	15
Max. permissible outlet pressure (absolute)	bar	2	2	2
Max. pressure difference between inlet and outlet	bar	1.1	1.1	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	120	180	180
No-load speed 50/60 Hz	min ⁻¹	1500/1800 1350/1620*	1500/1800	1500/1800
Rated current at 100 V~ 50/60 Hz	A	-	3.6/3.8	3.6/3.8
120 V ~ 60 Hz	A	-	3,0	3.0
230 V~ 50/60 Hz	A	1.1/1.1	1.4/1.6	1.4/1.6
100-120/200-230 V~ 50 Hz*	A	2.6/1.3	-	3.6/1.7
100-120/200-230 V~ 60 Hz*	A	2.6/1.3	-	3.8/1.8
Maximum permissible range of supply voltage Attention: Observe specifications of rating plate!		100 V~ +/-10% 50/60 Hz 120 V~ +5%/-10% 60 Hz 230 V~ +/-10% 50/60 Hz 100-120 V~ +5%/-10% 50/60 Hz* 200-230 V~ +/-10% 50/60 Hz*		
Motor protection		thermal cutout		
Degree of protection IEC 529		IP 54 IP 40*	IP 54 IP 40*	IP 54 IP 40*
Inlet		hose nozzle NW 10		
Outlet		hose nozzle NW 10		
Dimensions L x W x H	mm	258 x 164 x 249 283 x 164 x 249*	267 x 241 x 177 -	267 x 241 x 177 -
Weight approx.	kg	7.1 7.5*	10.6 -	10.6 -

* Pump with dual-voltage motor (100-120/200-230 V 50/60 Hz)

We reserve the right for technical modification without prior notice!

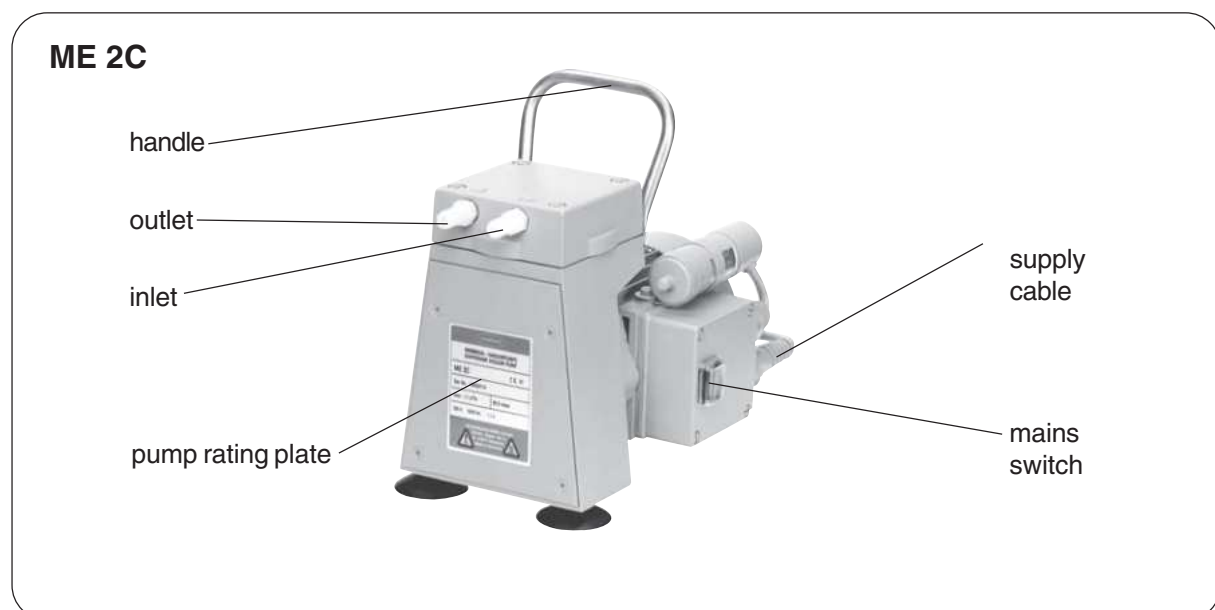
Type	MZ 2C + 2AK	MZ 2C + AK + EK	MZ 2C + AK Synchro + EK
Connection cooling water	-	hose nozzle NW 6	
Dimensions L x W x H mm	345 x 241 x 326	350 x 261 x 495	350 x 279 x 495
Weight approx. kg	11,9	13,8	14,1

Gas inlet temperatures:

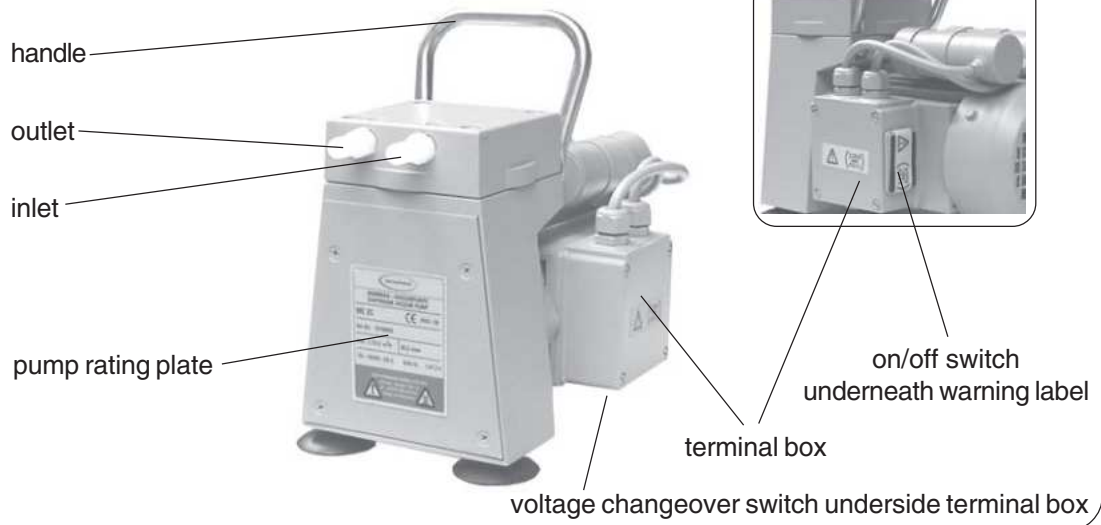
Operating condition	Inlet pressure	Permitted range of gas temperatures at inlet
Continuous operation	> 100 mbar (high gas load)	➡ +10°C to +40°C
Continuous operation	< 100 mbar (low gas load)	➡ 0°C to +60°C
Short-time operation (< 5 minutes)	< 100 mbar (low gas load)	➡ -10°C to +80°C

Components	Wetted parts
Housing cover insert	PTFE carbon reinforced
Head cover	ETFE carbon fibre reinforced
Diaphragm clamping disc	ETFE carbon fibre reinforced
Valve	ME 2C/ME 4C: PTFE / MZ 2C: FFKM
Diaphragm	PTFE
Inlet / outlet / fittings	ETFE or PP (MZ 2C + AK Synchro + EK)
Outlet	ETFE or PBT (outlet exhaust vaste vapour condenser)
Fittings	ETFE
Hose	PTFE

We reserve the right for technical modification without prior notice!



ME 2C with dual voltage motor 100-120/200-230 V



ME 4C

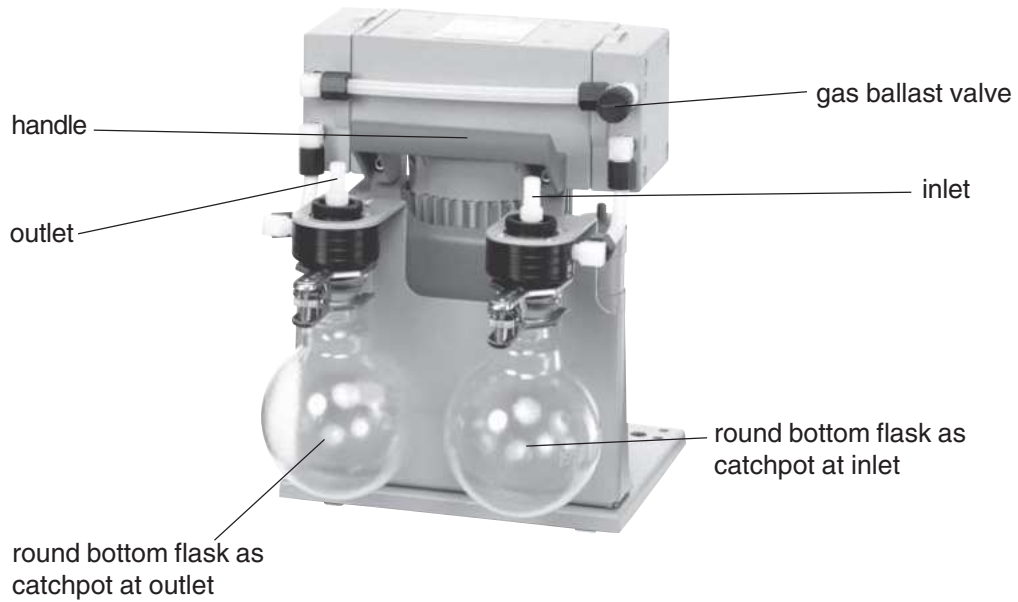


MZ 2C



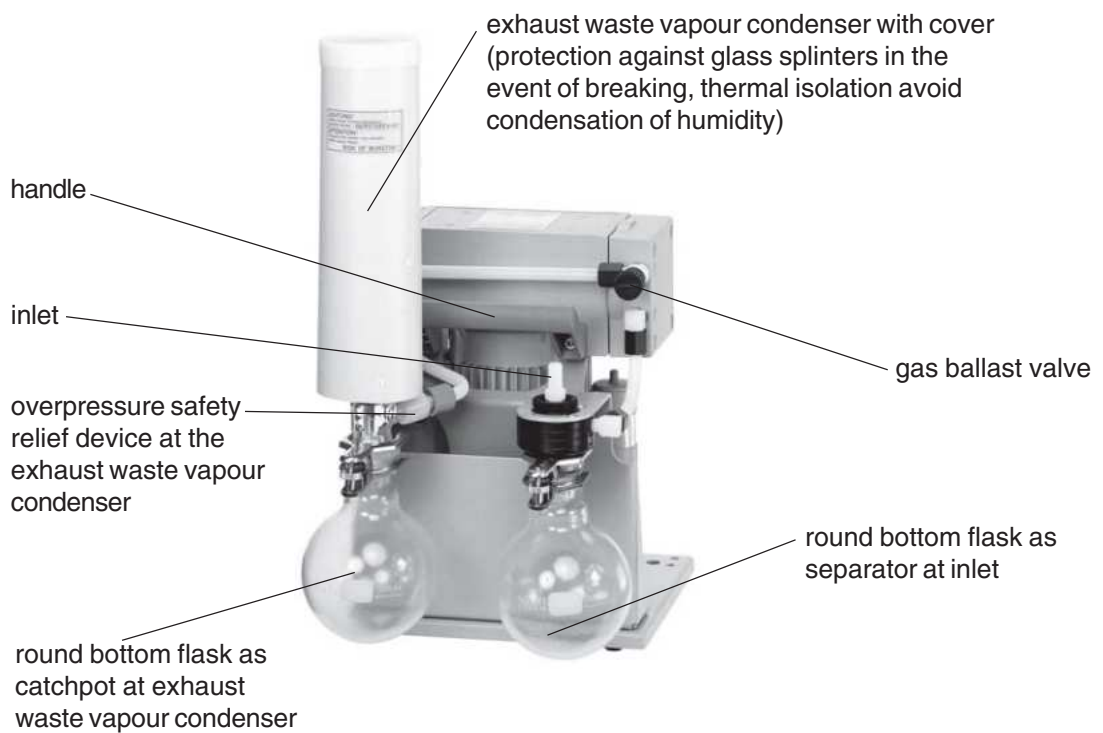
MZ 2C + 2 AK

(mounted to pump support with catchpot at inlet and outlet)



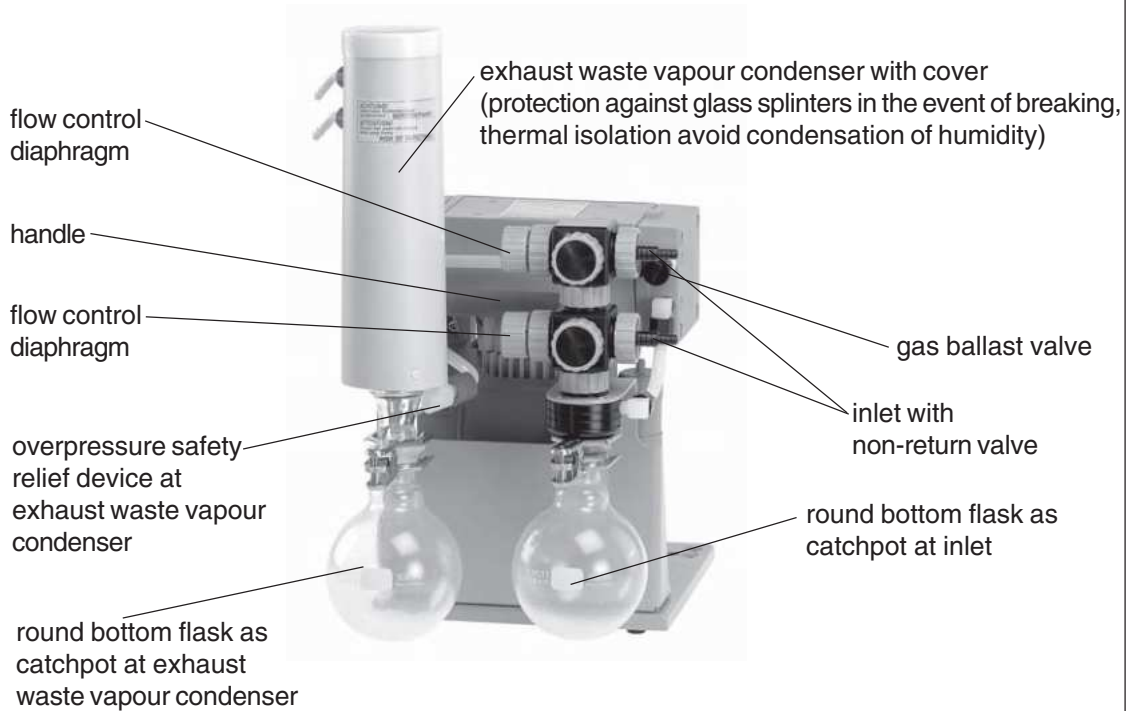
MZ 2C + AK + EK

(mounted to pump support with catchpot at inlet and exhaust waste vapour condenser)

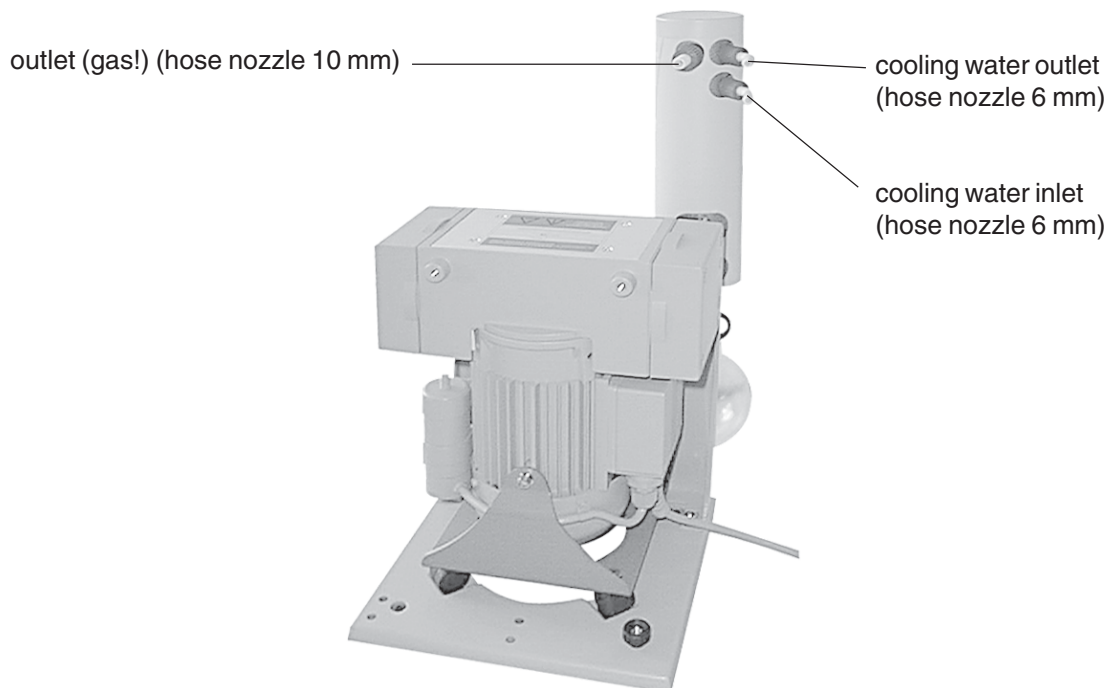


MZ 2C + AK Synchro + EK

(mounted to pump support with catchpot at inlet and exhaust waste vapour condenser)



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 surrounding atmosphere. Use a catchpot to prevent the drainage of contaminated condensate back into the pump
- ☞ **Before switching on the pump check that mains voltage and current conform with the equipment!**



Pump with dual-voltage motor:

- ☞ **Check that the voltage changeover switch underside the terminal box is positioned correctly.**

Attention: If the pump is switched on with the voltage not correctly selected, the motor may be damaged! Pay attention to the warning label on the on/off switch and remove after having set the voltage changeover switch to the correct position!

Selecting the supply voltage:



Attention:

Before starting the pump, check that the voltage changeover switch underside the terminal box is correctly positioned. Change the selection at the voltage changeover switch only if the pump is separated from mains.



Voltage changeover switch:

Use a screw driver to adjust the supply voltage on the **voltage changeover switch** at the terminal box of the pump: "115" corresponds to 100-120V and "230" corresponds to 200-230V.

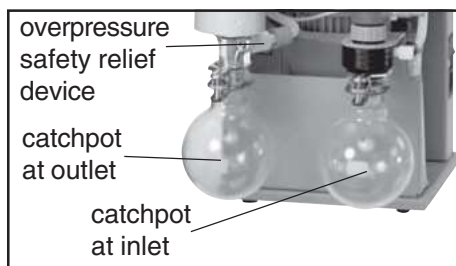


Prior to use:

- ☞ **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. IEC 60034 (motor may overheat due to insufficient cooling).
- ☞ Especially 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.

MZ 2C + AK + EK / MZ 2C + AK Synchro + EK / MZ 2C + 2 AK
with separator at the inlet and exhaust waste vapour condenser at the outlet:

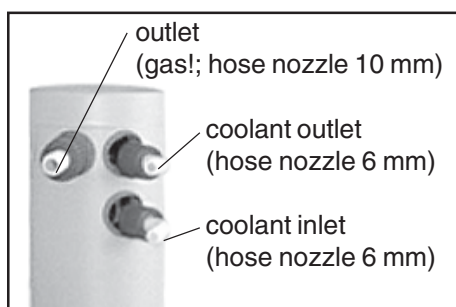


Round bottom flasks:

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.
- ➔ 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 **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.

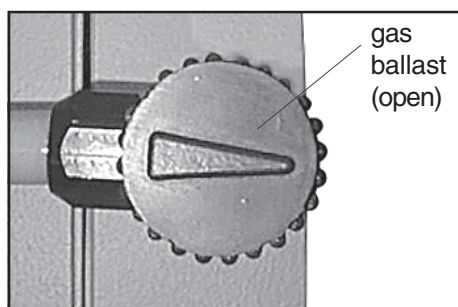
The motor is shut down by a **thermal cutout** in the winding.

- ☞ 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.



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 (see fig.). (Closing of gas ballast valve by turning the cap 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.

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. cooling water 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 regularly 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 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**?

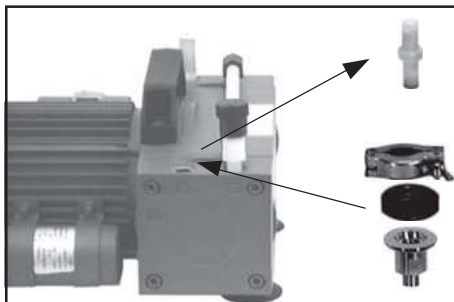
- ☞ Check and clean pump heads if necessary.

Long-term:

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

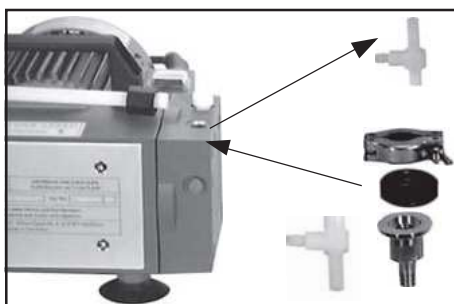
Accessories - installation

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
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(For installation an additional part is required:

Elbow fitting with extension	63 98 51)
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Note: Screw in small flange into elbow fitting max. 3 1/2 revolutions.

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



Pump support MZ 2C (kit)	69 99 25
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(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
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(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
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(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.



Controller support
with multiple socket outlet **69 99 36**
(to be assembled on base plate)

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



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).
- ☞ Field-tested vacuum controlling in combination with solenoid operated isolation valve VV 6C.



In-line valve 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} .

Troubleshooting

Fault	Possible cause	Remedy
<input type="checkbox"/> Pump fails to start or stops immediately.	<ul style="list-style-type: none"> ➔ Mains not plugged in, electrical supply failure? ➔ Pressure in outlet pipeline too high? ➔ Motor overloaded? ➔ Voltage changeover switch not correctly positioned? 	<ul style="list-style-type: none"> ☞ Plug in. Check fuse. ☞ Remove blockade in line, open valve. ☞ Allow motor to cool, identify cause of failure. ☞ Set the voltage changeover switch to the position being conform with the supply voltage.
<input type="checkbox"/> Pump does not achieve ultimate total pressure or normal pumping speed.	<ul style="list-style-type: none"> ➔ Centring ring not correctly positioned or leak in the pipeline or vacuum system? ➔ Long narrow line? ➔ Pump has been exposed to condensate? ➔ Deposits have been formed inside the pump? ➔ Valves or diaphragm damaged? ➔ Outgasing substances or vapour generated in the process? 	<ul style="list-style-type: none"> ☞ Check pump with a vacuum gauge directly at pump inlet port, check connections and line. ☞ Use line with larger diameter, length as short as possible. ☞ Run pump at atmospheric pressure for a few minutes. ☞ Clean and inspect pump heads. ☞ Replace valves and/or diaphragms. ☞ Check process parameters.
<input type="checkbox"/> Pump too noisy.	<ul style="list-style-type: none"> ➔ Atmospheric or high pressure at inlet port? ➔ Diaphragm clamping disc loose? ➔ None of above mentioned causes? 	<ul style="list-style-type: none"> ☞ Connect hose to pump outlet. ☞ Perform maintenance. ☞ Contact local distributor.
<input type="checkbox"/> Pump seized.		<ul style="list-style-type: none"> ☞ 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 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.

Depending on individual cases it may be efficient to check and clean the pump heads on a regular basis. In case of normal wear the lifetime of the diaphragms and valves is > 10000 operating hours.

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

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

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



Before starting maintenance vent the system, isolate the pump and other components from the vacuum system and the electrical supply. Drain condensate if applicable, avoid the release of pollutants. Allow sufficient cooling of the pump. **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.**



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

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 14/17
- Hex key size 5
- Face wrench with torque indicator

Cleaning and inspecting the pump heads:

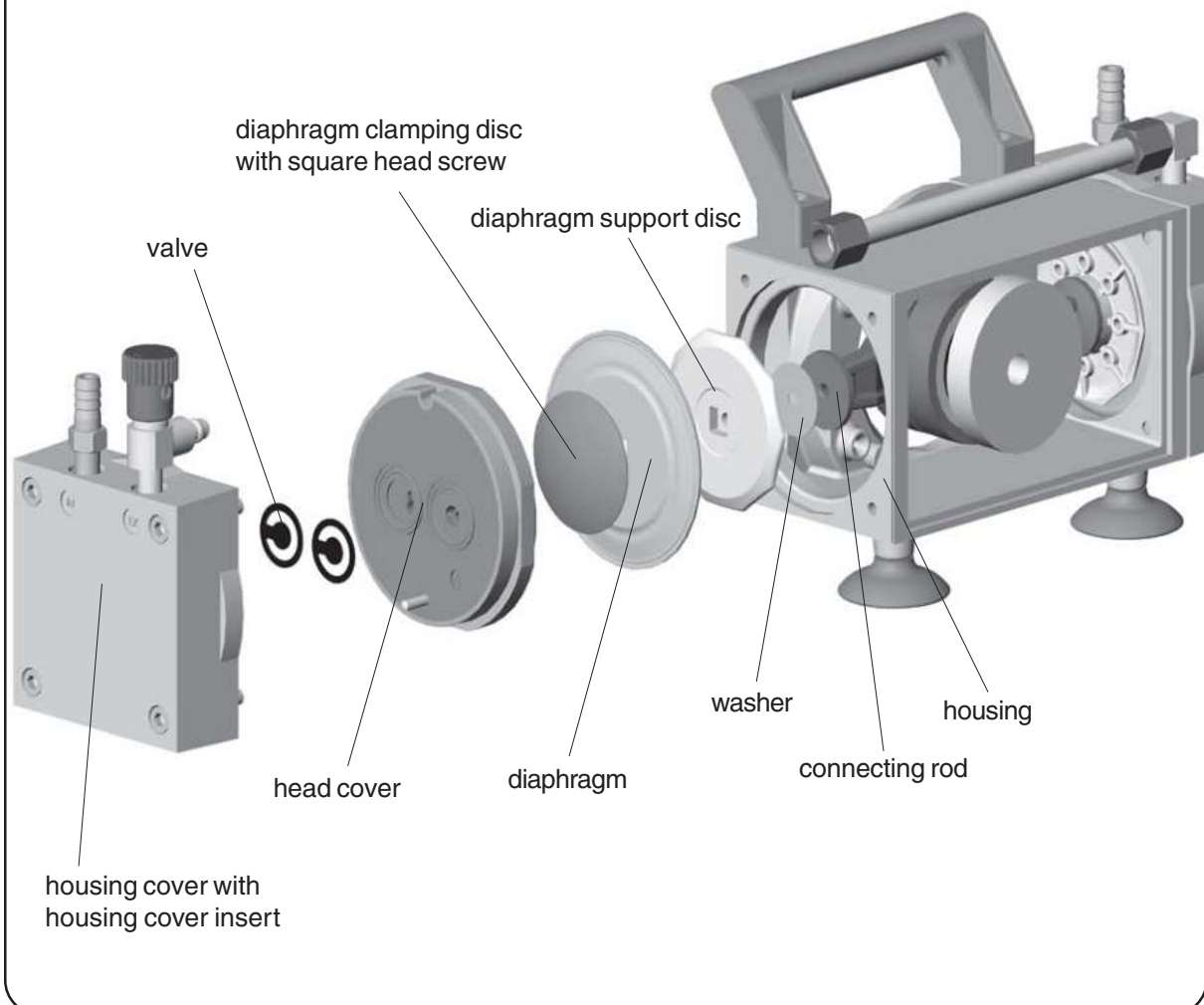


➔ Use open-ended wrench (w/f 17) to remove union nuts.



➔ 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.

View of the disassembled pump head parts



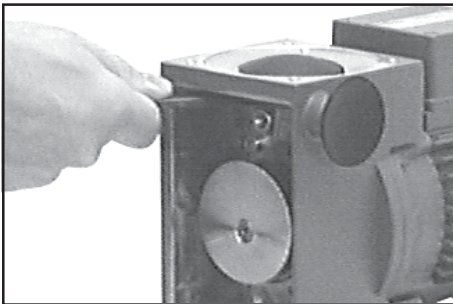


- ➔ To check valves use hex key to remove four socket head screws from pump head and remove upper housing (housing cover with housing cover insert), head cover and valves.
- ☞ Never remove parts by using a spiky or sharp-edged tool (e.g. screw driver), we recommend to use a rubber mallet or compressed 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.



- ☞ Check diaphragm for damage and replace if necessary.
- ➔ To do so use Phillips screw driver to remove four counter-sunk 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.
- ☞ **Note:** Position diaphragm with light-coloured PTFE side to diaphragm clamping disc (to pump chamber).

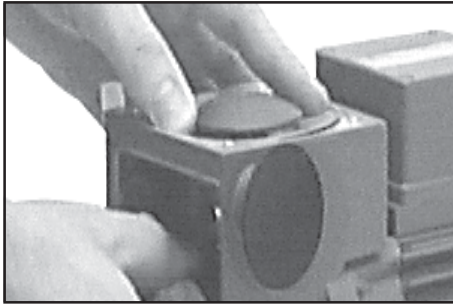


- ➔ Use **face wrench with torque indicator** (recommended: **face wrench with torque indicator from VACUUBRAND, Cat.-No.: 63 75 80**) to assemble diaphragm clamping disc, diaphragm and diaphragm support disc (and eventually washers) to the connecting rod.
- ☞ Make sure that the square head screw of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

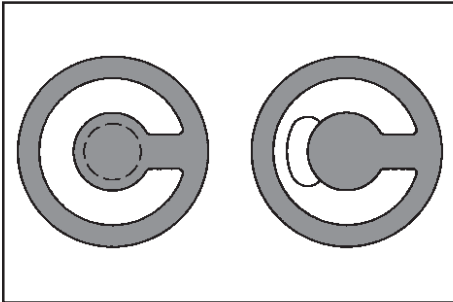
Optimum torque for the diaphragm support disc: **6 Nm**.

- ☞ 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.



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 cross-wise (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).

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.

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.**



**Konformitätserklärung
Declaration of conformity
Déclaration de conformité**

Membranpumpe / Diaphragm pump / Pompe à membrane

**ME 2C (69 61 21, 69 61 32) 230V
ME 2C (69 61 24) 100-230V
ME 4C (69 61 41, 69 61 49) 230V
MZ 2C (69 62 41, 69 62 65) 230V
MZ 2C + 2 AK (68 80 18, 68 81 71) 230V
MZ 2C + AK + EK (68 80 21, 68 81 74) 230V
MZ 2C + AK Synchro + EK (68 80 24, 68 81 77) 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 concerne conception, dessin et modèle vendu par nous-mêmes. Cette déclaration cesse d'être valable si des modifications sont apportées au dispositif sans notre autorisation préalable.

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

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, 19.04.2007

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

.....
(Dr. R. Lachenmann)

Geschäftsführer / Managing director / Gérant

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

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Dr. Bu

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