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vacuubrand

Technology for Vacuum Systems

Instructions for use





ME 4C NT
ME 8C NT
MZ 2C NT
MZ 2C NT + 2 AK
MZ 2C NT + AK + M + D
MZ 2C NT + AK + EK
MZ 2C NT + AK Synchro + EK
MD 4C NT
MD 4C NT + 2 AK
MD 4C NT + AK + EK
MD 4C NT + AK Synchro + EK
PC 101 NT
PC 201 NT

Chemistry diaphragm pumps
Chemistry vacuum systems
Chemistry pumping units

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

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

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

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



Caution! Hot surface!



Isolate equipment from mains before removing the cover.

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Safety information!

General information

NOTICE

☞ **Read and comply with this manual before installing or operating the equipment.**
☞ Transport the pump at the provided handle.
Remove all packing material, remove the product from its packing-box, remove the protective covers from the inlet and outlet ports and keep, inspect the equipment.
If the equipment is damaged, notify the supplier and the carrier in writing within three days; state the item number of the product together with the order number and the supplier's invoice number. Retain all packing material for inspection.
Do not use the equipment if it is damaged.
If the equipment is not used immediately, replace the protective covers. Store the equipment in suitable conditions.

Intended use

⚠WARNING

☞ The pump and all system parts must not be used on humans or animals.
☞ Prevent any part of the human body from coming into contact with vacuum.
☞ Ensure that the individual components are only connected, combined and operated according to their design and as indicated in the instructions for use.
☞ Comply with notes on correct vacuum and electrical connections, see section "Use and operation".

⚠CAUTION

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

NOTICE

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

Setting up and installing the equipment

⚠ DANGER

➨ Equipment must be connected only to a **suitable electrical supply** and a suitable earth point. Failure to connect the motor to ground may result in deadly electrical shock.
The supply cable may be fitted with a moulded European IEC plug or a plug suitable for your local electrical supply. If the plug has been removed or has to be removed, the cable will contain wires colour coded as follows: green or green and yellow: earth; blue or white: neutral; brown or black: live.

⚠WARNING

☞ Due to the high compression ratio of the pumps, pressure at the outlet port might be generated being higher than the maximum permissible pressure compatible with the mechanical stability of the system.
☞ Do not permit any **uncontrolled pressurizing** (e. g. make sure that the exhaust pipeline cannot become blocked). If there is an exhaust isolation valve, make sure that you cannot operate the equipment with the valve closed. **Risk of bursting!**
☞ Always provide a free and pressureless exhaust pipeline.

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☞ Ensure that the **coolant outlet pipeline** is always free and that it cannot get blocked. Install a optional coolant valve always in the supply line of the exhaust waste vapour condenser only.
☞ 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.

⚠CAUTION

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

- Check that mains voltage and current conform with the equipment (see rating plate).

- Change the setting of the voltage changeover switch (pump with dual-voltage motor) only if the pump is separated from mains. Check that the voltage changeover switch is set correctly. **Attention**: If the pump is switched on with wrong voltage selection, the motor might be damaged!

- Avoid overpressure of more than 0.2 bar in case inert gas is connected to the pump, the gas ballast or to a venting valve.
- Connect pipes gas tight at inlet and outlet of the pump.
- **Attention:** Flexible elements tend to shrink when evacuated.

NOTICE

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

Keep a distance of minimum 20 cm between fan and ambient parts (e.g. housing, walls, ...). Check fan regularly for dust/dirt, clean if necessary to avoid a cutback of ventilation.

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

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

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

Ambient conditions

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

NOTICE

Adopt suitable measures in case of differences, e. g. using the equipment outdoors, installation in altitudes of more than 1000 m above mean sea level, conductive pollution or bedewing.
Pay attention to the **permissible maximum ambient and gas inlet temperatures** (see ”Technical data”).

Operating conditions

DANGER

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

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

CAUTION

- The pumps are **not suitable** for pumping substances which may form **deposits** inside the pump. Deposits and condensate in the pump may lead to increased temperatures even to the point of excessing the maximum permitted temperatures!

- If there is a danger of formation of **deposits** in the pump chamber (check inlet and outlet of the pump), inspect the pump chambers regularly and clean if necessary.

- The pumps are **not suitable** for pumping dust and have **no approval** for operation below ground.

NOTICE

If pumping **different substances**, it is recommended to purge the pump with air or inert gas prior to changing the pumped media in order to pump out residues and to avoid reactions of the pumped substances with each other and with the pump materials.
Take into consideration interactions and chemical reactions of the pumped media. Ensure that the materials of the wetted parts are compatible with the pumped substances, see section ”Technical data”.

Safety during operation

DANGER

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

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

➨ The user must take suitable precautions to prevent any formation of explosive mixtures in the expansion chamber or at the outlet. In case of e.g. a diaphragm crack, mechanically generated sparks, hot surfaces or static electricity may ignite these mixtures. Use inert gas for gas ballast or venting if necessary.
➨ Potentially explosive mixtures at the outlet of the pump have to be drained appropriately, sucked off or diluted with inert gas to non-explosive mixtures.



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

WARNING

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

⚠CAUTION

- Comply with applicable regulations when disposing of chemicals. Take into consideration that chemicals may be polluted.
  Take adequate precautions to protect people from the effects of dangerous substances (chemicals, thermal decomposition products of fluoroelastomers), wear appropriate safety-clothing and safety glasses.

- Use only **OEM spare parts and accessories.** Otherwise safety and performance of the equipment as well as the electromagnetic compatibility of the equipment might be reduced.
  Possibly the CE mark or the cTÜVus mark become void if not using OEM spare parts.

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

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

NOTICE

Do not start the pump if the pressure difference between inlet and outlet port exceeds 1.1 bar at maximum.
Prevent the backpressure of gases and the backflow of condensates.
Never suck liquids or dust into the pump.

Check liquid level in both catchpots regularly and drain condensate in time. In case, install level sensor (see “Accessories“).

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

In case of overload the motor is shut down by a **self-hold thermal cutout** in the winding.
Attention: Reset possible only manually. Switch off the pump or isolate the equipment from mains. Identify and eliminate the cause of failure. 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.

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

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Maintenance and repair

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

⚠CAUTION

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



➨ **Isolate equipment from mains** and **wait two minutes** before starting maintenance to allow the capacitors to discharge.

⚠WARNING

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

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

⚠CAUTION

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

Ensure that **maintenance** is done only by suitably trained and supervised technicians. Ensure that the maintenance technician is familiar with the safety procedures which relate to the products processed by the pumping system.
In order to comply with law (occupational, health and safety regulations, safety at work law and regulations for environmental protection) vacuum pumps, components and measuring instruments returned to the manufacturer can be repaired only when certain procedures (see section **”Notes on return to the factory”**) are followed.

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Technical data

Type		ME 4C NT	MZ 2C NT MZ 2C NT + 2 AK MZ 2C NT + AK + EK MZ 2C NT + AK SYNCHRO + EK MZ 2C NT + AK + M + D PC 101 NT
Maximum pumping speed* 50/60 (ISO 21360)	m^3/h	3.9 / 4.4	2.0 / 2.3
Ultimate vacuum (absolute) without gas ballast	mbar	70	7
Ultimate vacuum (absolute) with gas ballast	mbar	-	12
Maximum permissible inlet pressure (absolute)	bar	1.1	
Maximum permissible outlet pressure (absolute)	bar	1.1	
Maximum permissible pressure (absolute) at gas ballast valve	bar	-	1.2
Permissible ambient temperature storage / operation	°C	-10 to +60 / +10 to +40	
Permissible relative atmospheric moisture during operation (no condensation)	%	30 to 85	
Rated motor power	kW	0.18	
No-load speed 50/60 Hz	min^{-1}	1500 / 1800	
Maximum permissible range of supply voltage (±10%) **Attention: Observe specifications of rating plate!** Dual voltage motor		100-115 V~ 50/60 Hz, 120V~ 60 Hz 230 V~ 50/60 Hz 100-115 V~ 50/60 Hz, 120 V 60 Hz / 200-230 V~ 50/60 Hz	
Maximum rated current at: 100-115 V~ 50/60 Hz, 120 V 60 Hz 200-230 V~ 50/60 Hz 230 V~ 50/60 Hz	 A A A	 3.4 1.8 1.8	
Device fuse		slow blow fuse 6.3 A	
Motor protection		thermal cutout, manual reset	
Degree of protection IEC 529		IP 40	
Inlet		hose nozzle DN 10 mm or small flange KF 16	
Outlet		hose nozzle DN 10 mm	
Coolant connection (only ”EK”)		-	hose nozzle DN 6-8 mm
Maximum permissible pressure of coolant at waste vapour condenser	bar	-	6 (absolute)

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Type		ME 4C NT	MZ 2C NT MZ 2C NT + 2 AK MZ 2C NT + AK + EK MZ 2C NT + AK SYNCHRO + EK MZ 2C NT + AK + M + D PC 101 NT
Permissible range of coolant temperature (only ”EK”)	°C	-	-15 to +20
Volume of catchpot (only ”AK” / ”EK”)	ml	-	500
Dimensions L x W x H approx.			
Pump:	mm	254 x 243 x 198	243 x 243 x 198
Vacuum systems:			
design 2 AK	mm	-	319 x 243 x 309
design AK + EK	mm	-	326 x 243 x 402
design AK SYNCHRO + EK	mm	-	326 x 248 x 402
design AK + M + D	mm	-	310 x 243 x 313
PC 101 NT	mm	-	326 x 243 x 402
Weight approx.			
Pump:	kg	11.1	11.1
Vacuum systems:			
design 2 AK	kg	-	13.6
design AK + EK	kg	-	14.2
design AK SYNCHRO + EK	kg	-	14.5
design AK + M + D	kg	-	13.4
PC 101 NT	kg	-	14.5

Type		ME 8C NT	MD 4C NT MD 4C NT + 2 AK MD 4C NT + AK + EK MD 4C NT + AK SYNCHRO + EK PC 201 NT
Maximum pumping speed* 50/60 Hz (ISO 21360)	m^3/h	7.1 / 7.8	3.4 / 3.8
Ultimate vacuum (absolute) without gas ballast	mbar	70	1.5
Ultimate vacuum (absolute) with gas ballast	mbar	-	3
Maximum permissible inlet pressure (absolute)	bar	1.1	
Maximum permissible outlet pressure (absolute)	bar	1.1	
Maximum permissible pressure (absolute) at gas ballast valve	bar	-	1.2
Permissible ambient temperature storage / operation	°C	-10 to +60 / +10 to +40	
Permissible relative atmospheric moisture during operation (no condensation)	%	30 to 85	
Rated motor power	kW	0.25	

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Type		ME 8C NT	MD 4C NT MD 4C NT + 2 AK MD 4C NT + AK + EK MD 4C NT + AK SYNCHRO + EK PC 201 NT
No-load speed 50/60 Hz	min^{-1}	1500 / 1800	
Maximum permissible range of supply voltage (±10%) **Attention: Observe specifications of rating plate!**		100 V~ 50/60 Hz	100-115 V~ 50/60Hz, 120 V~ 60 Hz
		120 V~ 60 Hz	-
		230 V~ 50/60 Hz	
Dual voltage motor		100-115 V~ 50/60 Hz, 120 V~ 60 Hz / 200-230 V~ 50/60 Hz	
Maximum rated current at:			
100 V~ 50/60 Hz	A	5.0	
120 V~ 60 Hz	A	4.0	
100-115 V~ 50/60 Hz 120 V~ 60 Hz	A	5.7	
200-230 V~50/60 Hz	A	3.0	
230V~ 50/60 Hz	A	3.0	
Device fuse		slow blow fuse 6.3 A	
Motor protection		thermal cutout, manual reset	
Degree of protection IEC 529		IP 40	
Inlet		hose nozzle DN 10 mm	
Outlet		hose nozzle DN 10 mm	
Coolant connection (only ”EK”)		-	hose nozzle DN 6-8 mm
Maximum permissible pressure of coolant at waste vapour condenser	bar	-	6 (absolute)
Permissible range of coolant temperature (only ”EK”)	°C	-	-15 to +20
Volume of catchpot (only ”AK”/”EK”)	ml	-	500
Dimensions L x W x H approx.			
Pump:	mm	325 x 243 x 198	325 x 243 x 198
Vacuum systems:			
design 2 AK	mm	-	319 x 243 x 374
design AK + EK	mm	-	326 x 243 x 402
design AK SYNCHRO + EK	mm	-	326 x 248 x 402
PC 201 NT	mm	-	326 x 243 x 402
Weight approx.			
Pump:	kg	14.3	14.3
Vacuum systems:			
design 2 AK	kg	-	16.7
design AK + EK	kg	-	17.3
design AK SYNCHRO + EK	kg	-	17.6
PC 201 NT	kg	-	17.5

* Pumping speed of diaphragm pump

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

Wetted parts

Components	Wetted materials
Head cover	ETFE carbon fibre reinforced
Diaphragm clamping disc	ETFE carbon fibre reinforced
Diaphragm	PTFE
Valves (ME 4C NT / ME 8C NT)	PTFE
Valves (MZ 2C NT / MD 4C NT)	FFKM
O-rings	FPM
Valve head	ECTFE carbon fibre reinforced
Gas ballast tube	PTFE carbon reinforced
Inlet (hose nozzle) Pump Vacuum systems Inlet (small flange)	 PTFE PP (PBT only SYNCHRO designs) stainless steel
Outlet (hose nozzle) Pump / MZ 2C NT + AK + M + D Vacuum systems (waste vapour condenser) Vacuum systems (2 AK)	 PTFE PET PP
Tubing	PTFE
Flow control diaphragm	PTFE
Valve block (SYNCHRO design)	PP
Valves (valve block SYNCHRO)	FFKM
Distribution head	PPS glass fibre reinforced
Blind plug	PP
O-ring at catchpot	FPM
Overpressure safety relief device	PTFE / silicone rubber
Exhaust waste vapour condenser / catchpot	Borsilicate glass

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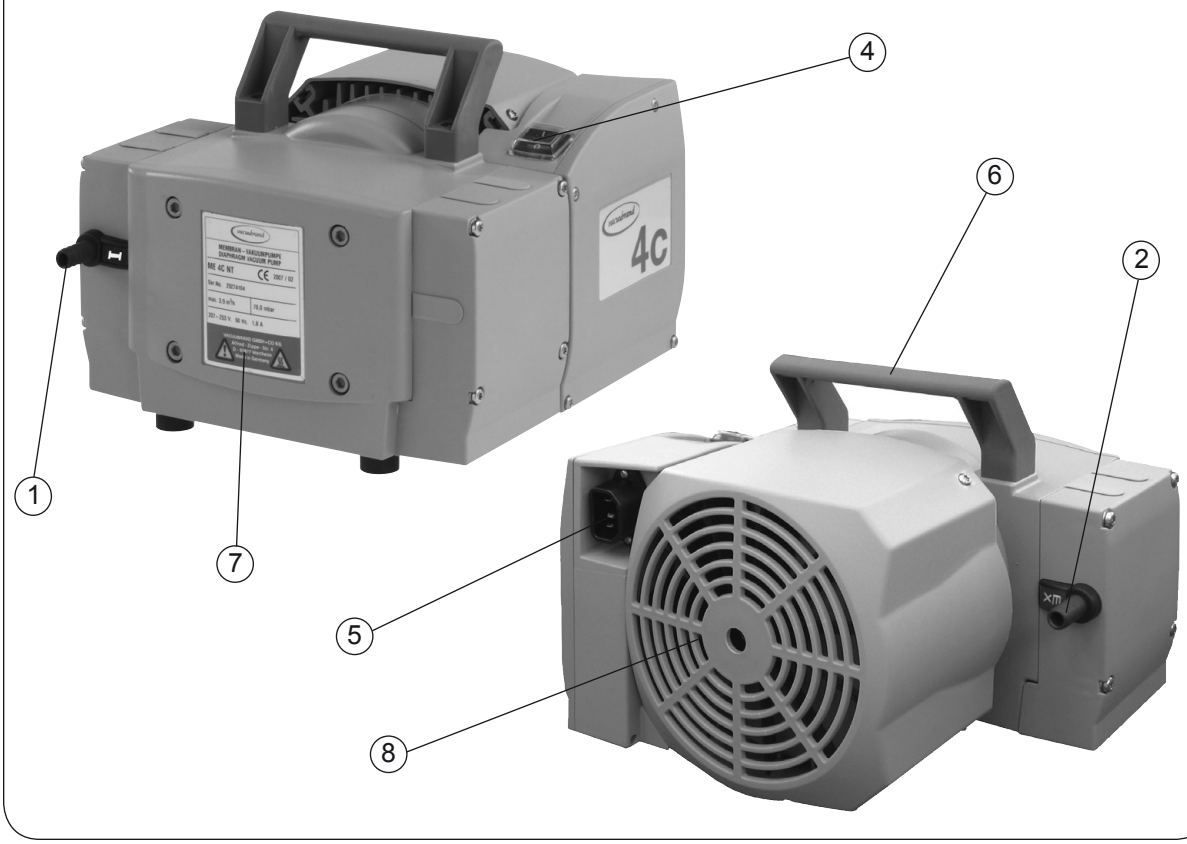
Pump parts

Position	Component
1	Inlet
2	Outlet
3	Gas ballast valve
4	ON/OFF switch
5	Mains connection
6	Handle
7	Pump rating plate
8	Fan
9	Catchpot
10	Exhaust waste vapour condenser

Position	Component
11	Overpressure safety relief device
12	Coolant inlet
13	Coolant outlet
14	Flow control diaphragm
15	Manometer
16	Valve block
17	Distribution head
18	Blind plug

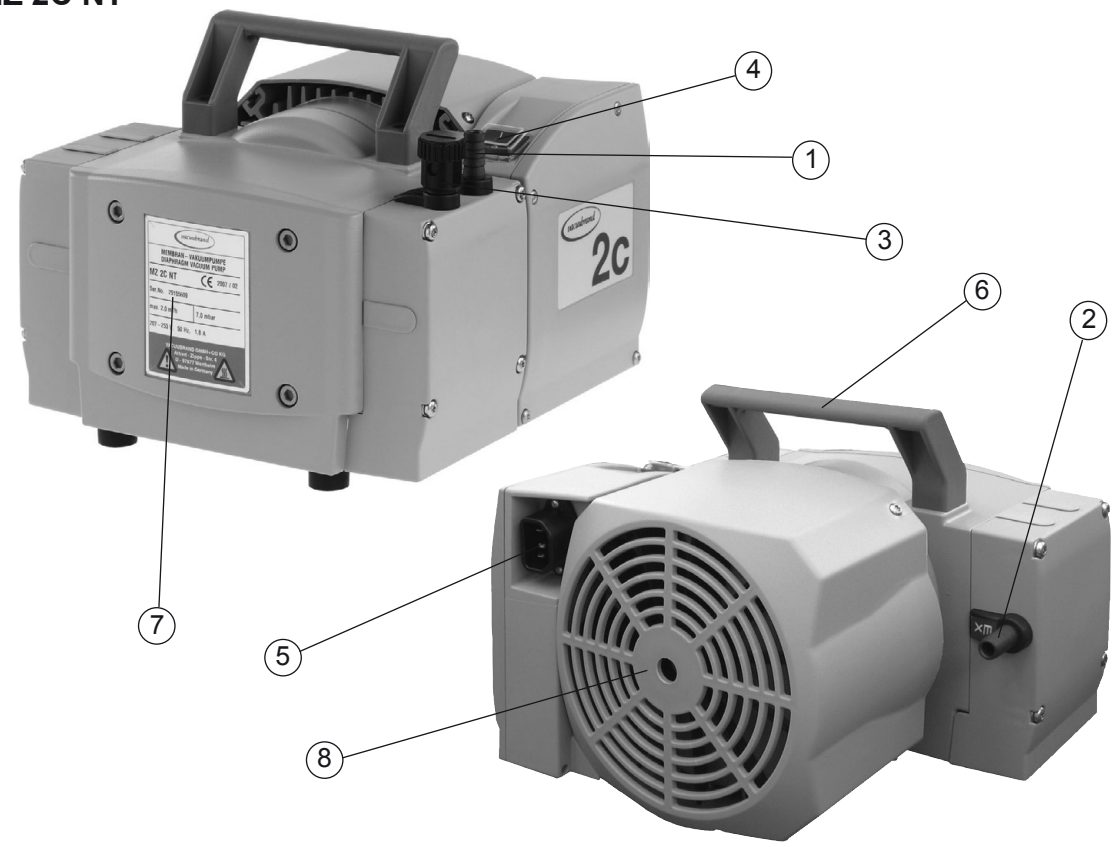
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ME 4C NT

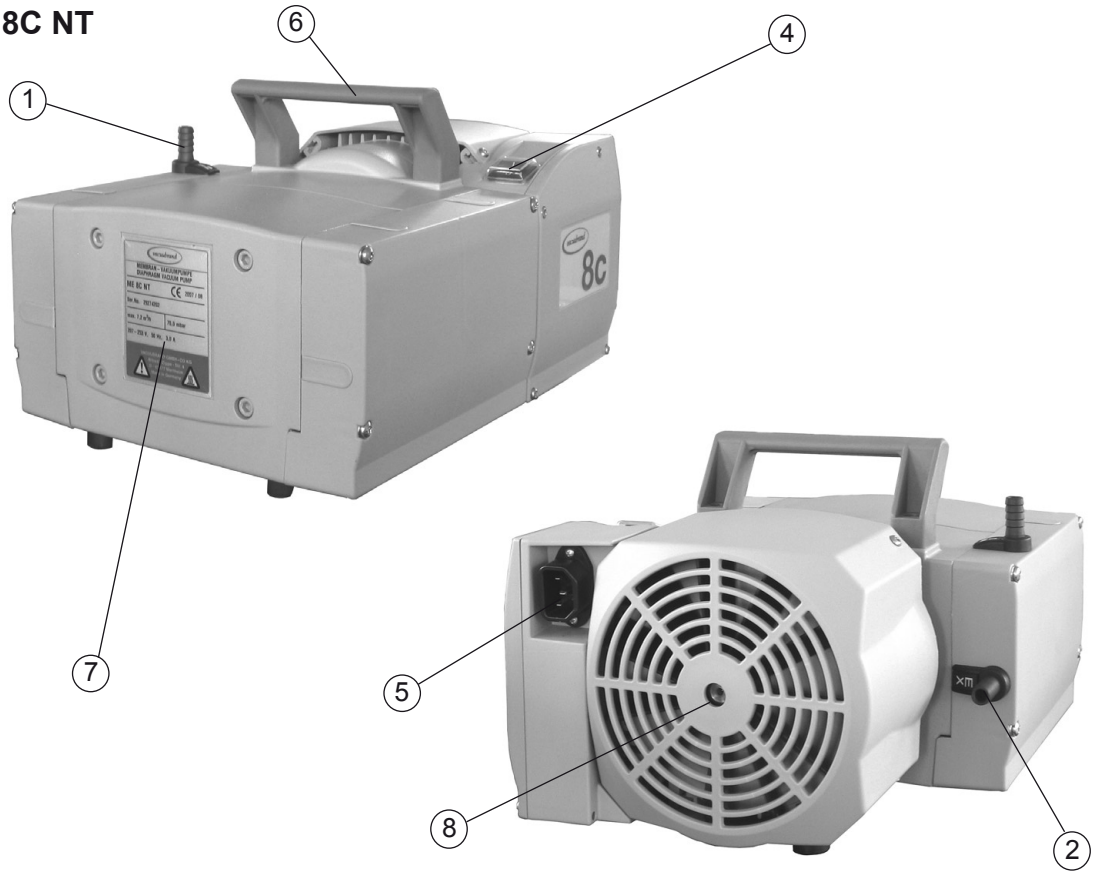


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MZ 2C NT

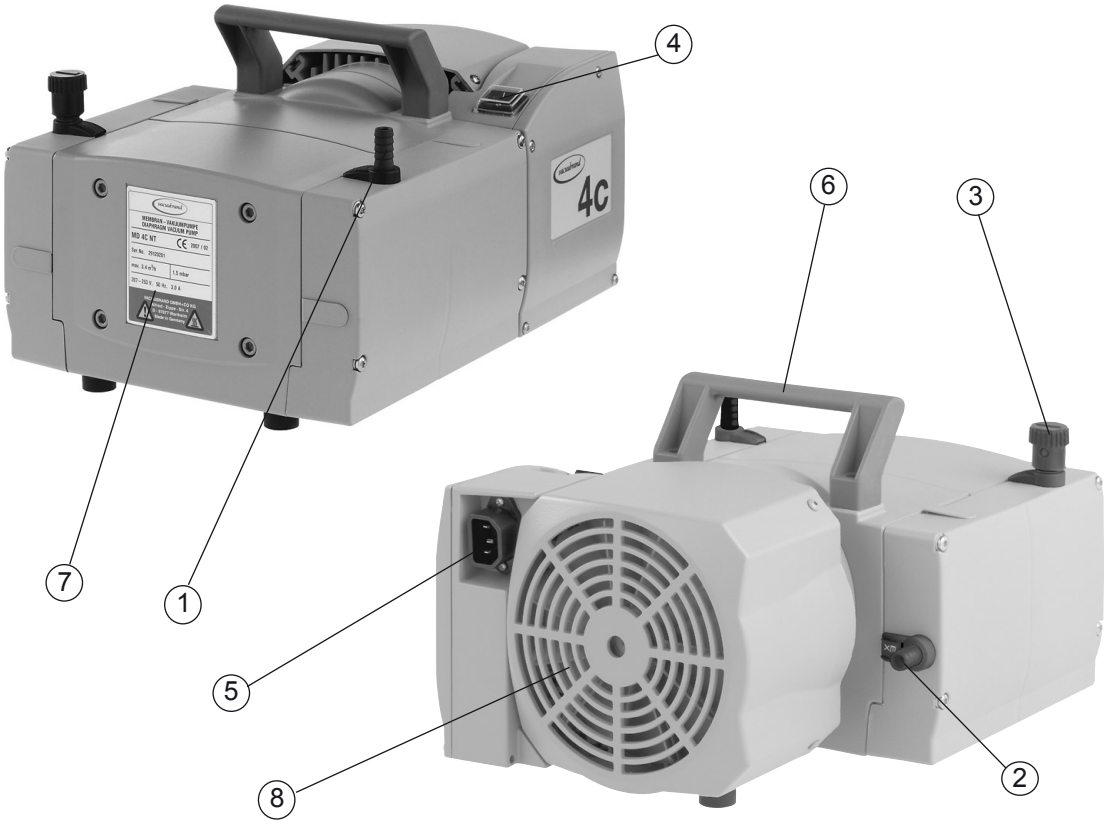


ME 8C NT

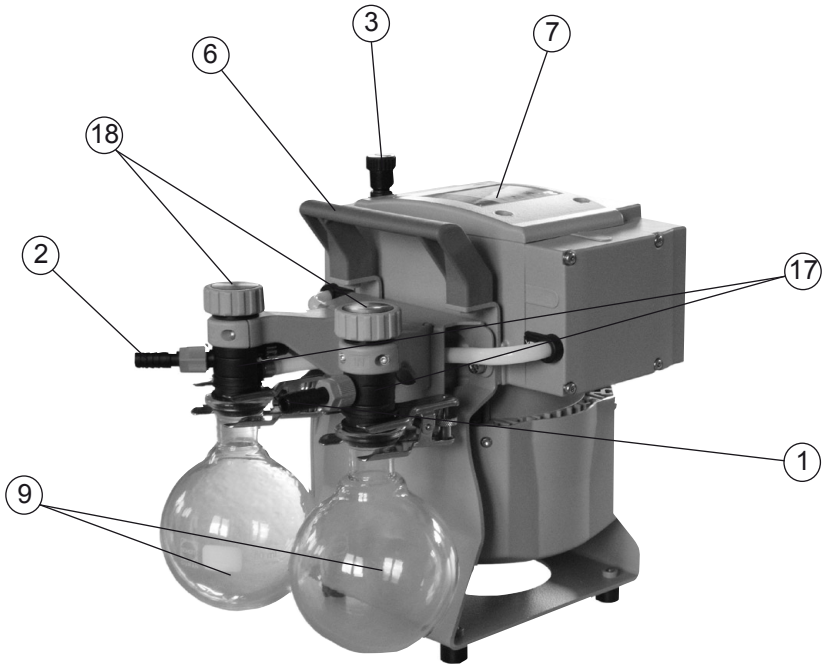


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MD 4C NT



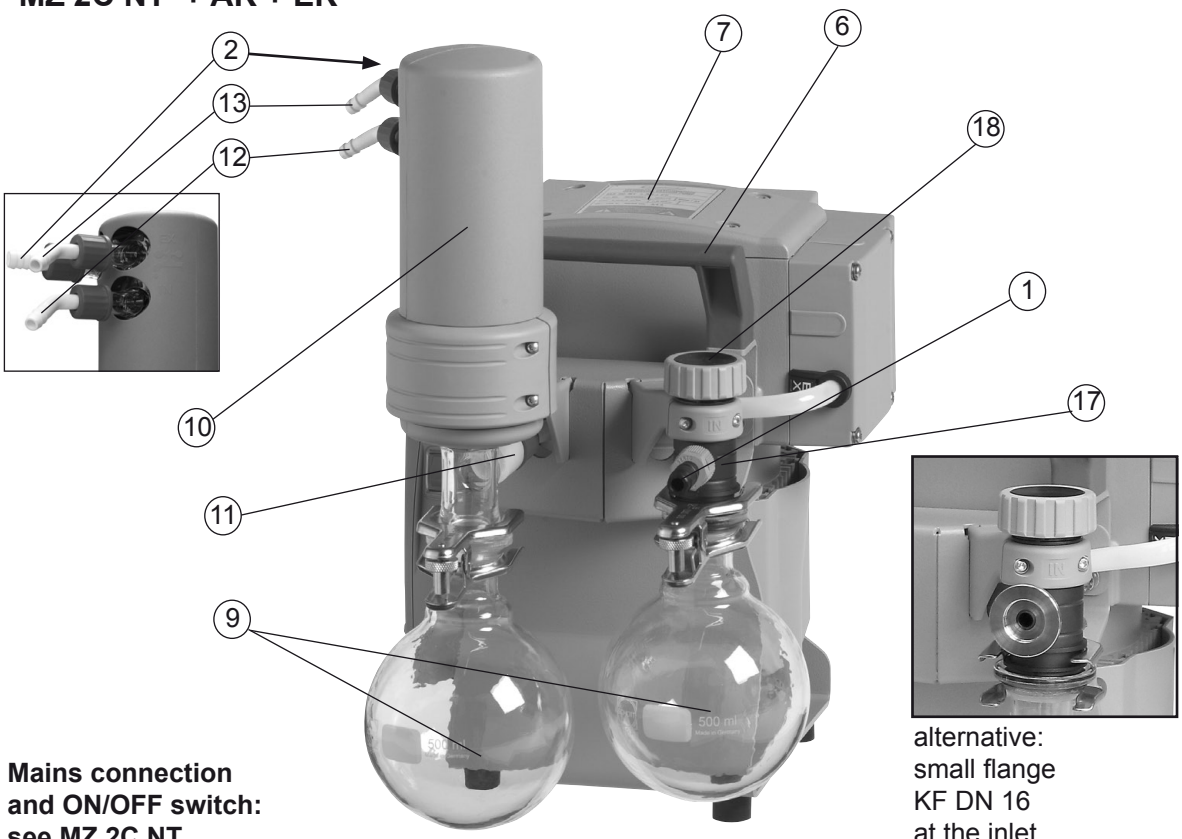
MZ 2C NT + 2 AK



Mains connection and ON/OFF switch: see MZ 2C NT

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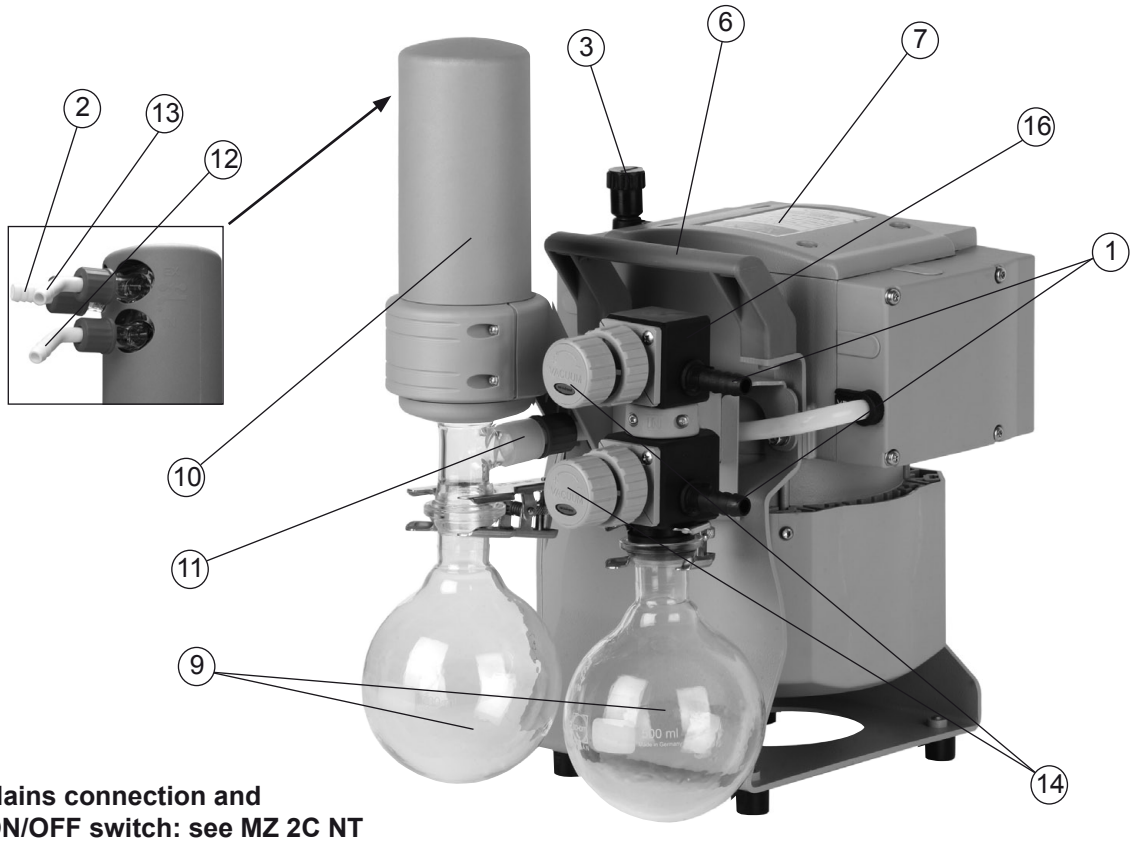
MZ 2C NT + AK + EK



Mains connection and ON/OFF switch: see MZ 2C NT

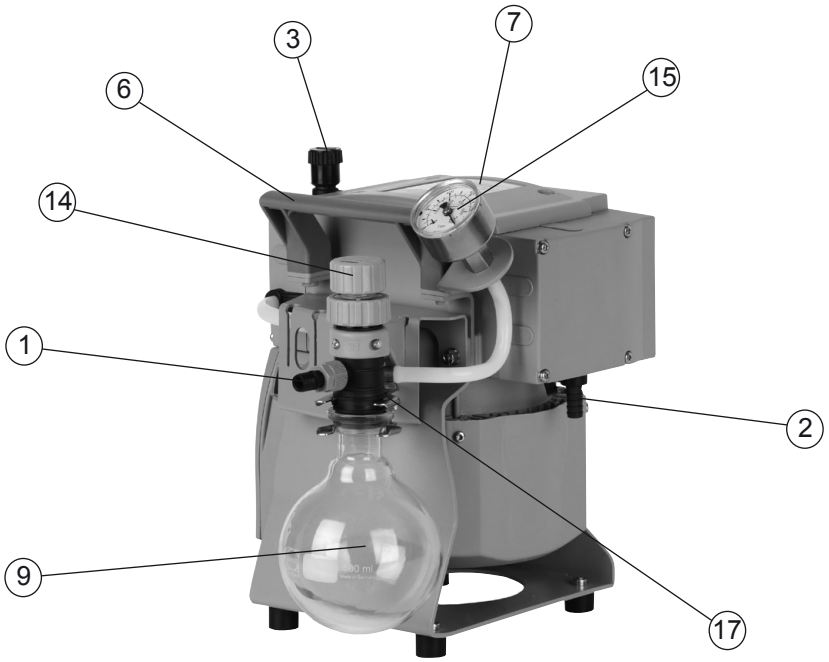
alternative: small flange KF DN 16 at the inlet

MZ 2C NT + AK SYNCHRO + EK



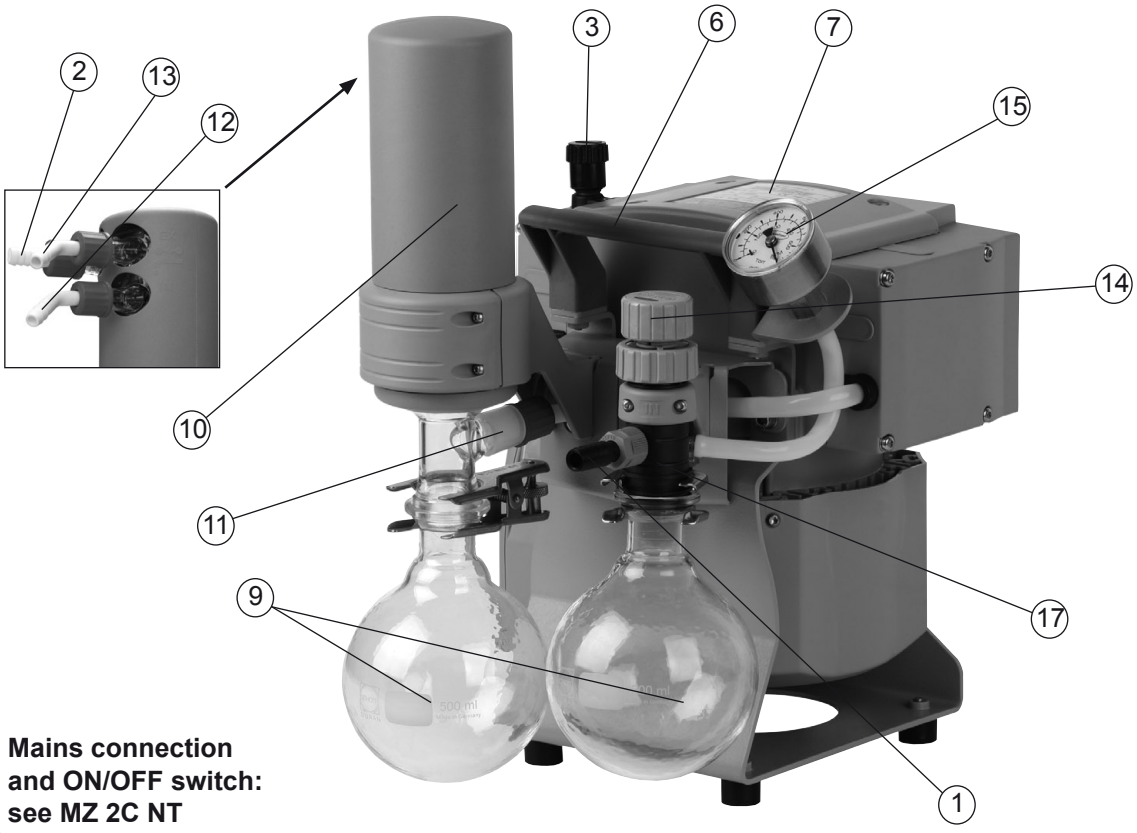
Mains connection and ON/OFF switch: see MZ 2C NT

MZ 2C NT + AK + M + D



Mains connection and ON/OFF switch: see MZ 2C NT

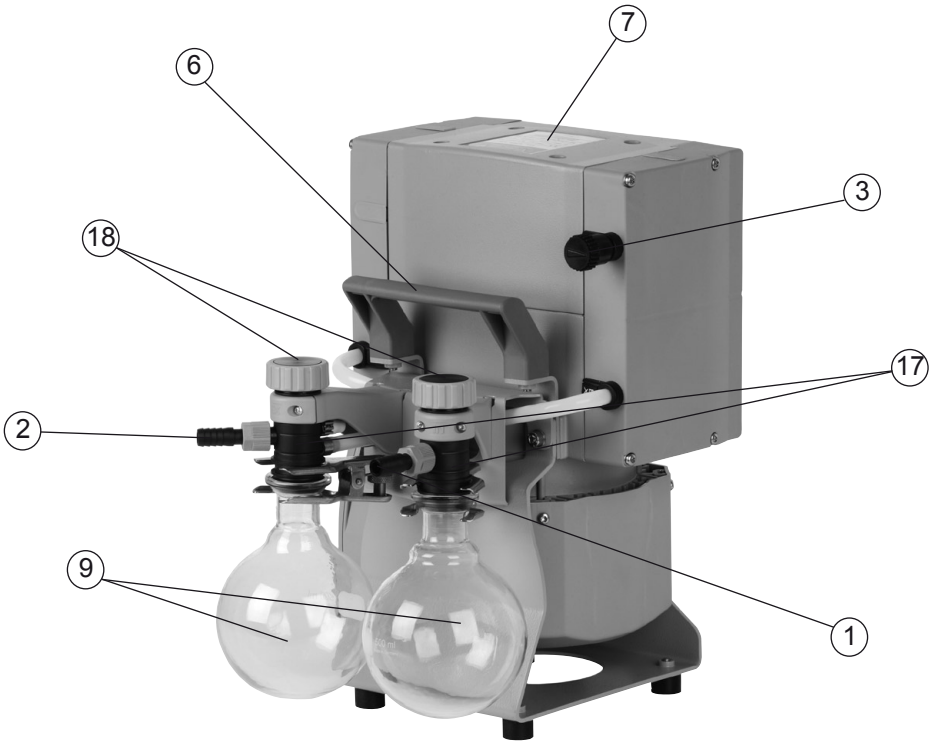
PC 101 NT



Mains connection and ON/OFF switch: see MZ 2C NT

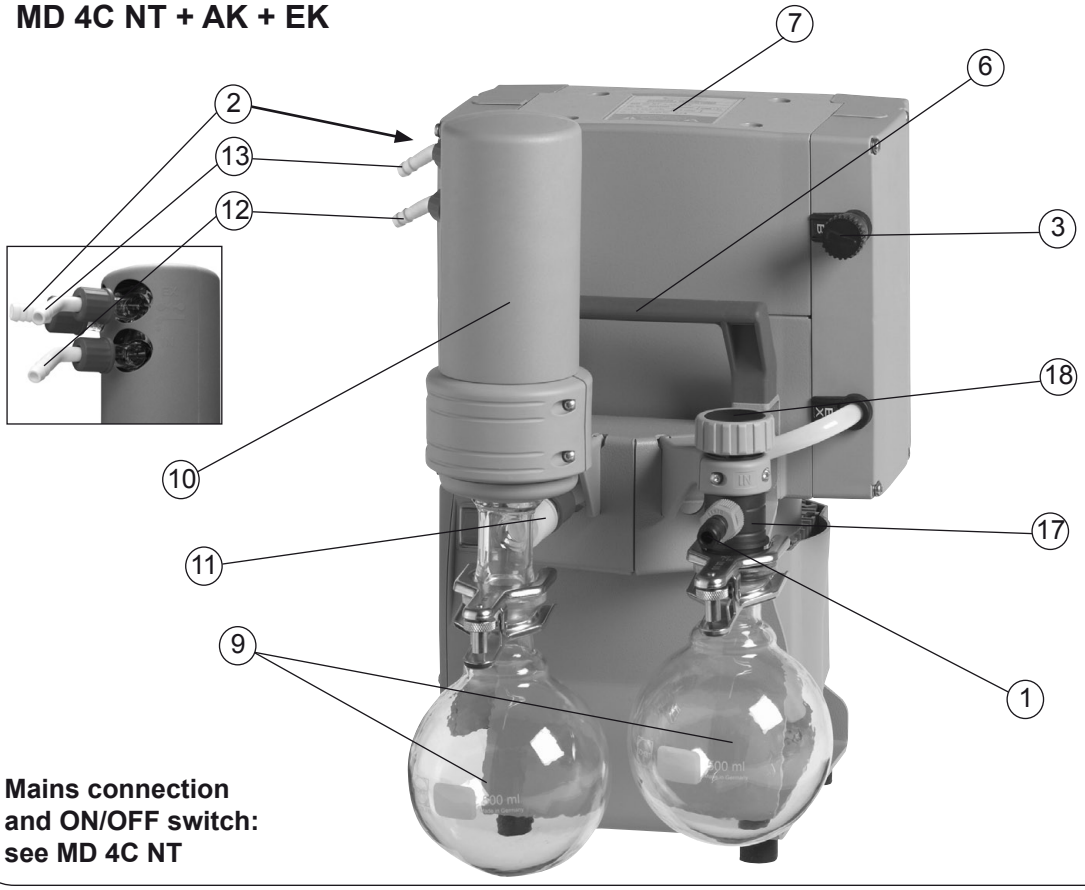
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MD 4C NT + 2 AK



Mains connection and ON/OFF switch: see MD 4C NT

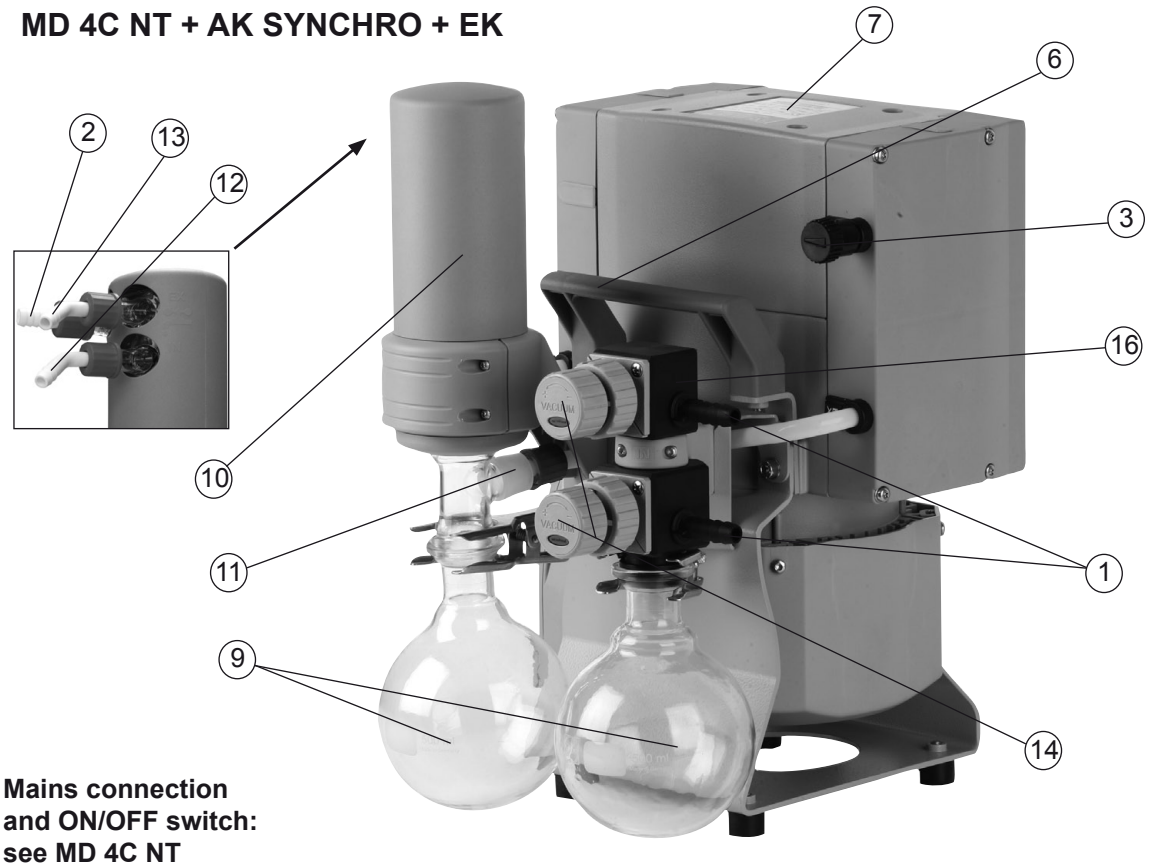
MD 4C NT + AK + EK



Mains connection and ON/OFF switch: see MD 4C NT

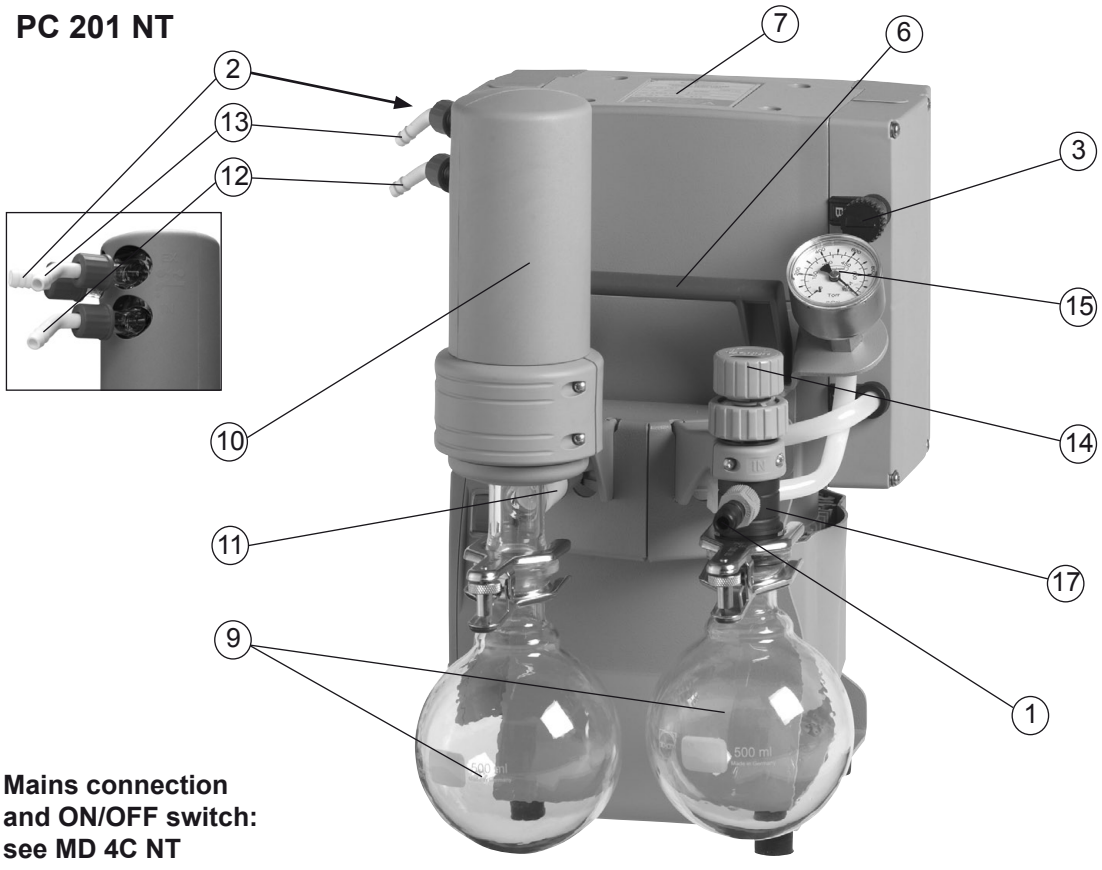
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MD 4C NT + AK SYNCHRO + EK



Mains connection and ON/OFF switch: see MD 4C NT

PC 201 NT



Mains connection and ON/OFF switch: see MD 4C NT

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Use and operation

Installing in a vacuum system

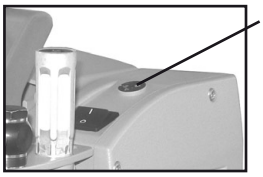
⚠CAUTION

- Connection lines at the pump inlet have to be gas tight. Particles and dust must not be aspirated, the user has to provide appropriate filters if necessary. The user must ensure their suitability concerning gas flow, chemical resistance and safeness against clogging prior to use.
- Connect an exhaust line gas tight at the pump outlet if necessary. Always dispose of exhaust gases appropriately (e.g. into a fume hood). If there is risk of release of dangerous or polluting fluids, install an appropriate system to catch and dispose of those fluids.

- Reduce the transmission of vibration and prevent mechanical load due to rigid pipelines. Insert elastic hoses or flexible elements as couplings between the pump and rigid pipes. **Attention:** Flexible elements tend to shrink when evacuated.
- The gas outlet must never be blocked. The exhaust line has always to be free (pressureless) to ensure an unimpeded discharge of gas.
- Especially if the gas ballast valve is open, a power failure may cause accidental ventilation of the pump. In case this constitutes a potential source of danger, take appropriate safety measures.

- **Pump with dual-voltage motor**: Check that the voltage changeover switch at the terminal box is positioned correctly.
  Attention: If the pump is switched on with wrong voltage selection, the motor may be damaged!
  Before starting the pump, check that the voltage changeover switch at 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:
Change the selection at the voltage changeover switch only if the pump is separated from mains.
Use a screw driver to adjust the supply voltage on the **voltage changeover switch** at the terminal box of the pump:
”115” corresponds to 90-126 V and
”230” corresponds to 180-253 V.



⚠CAUTION

- Make sure ventilation is adequate especially if the pump is installed in a housing or if the ambient temperature is elevated. Provide external ventilation if necessary. Keep a distance of minimum 20 cm between fan and ambient parts.

NOTICE

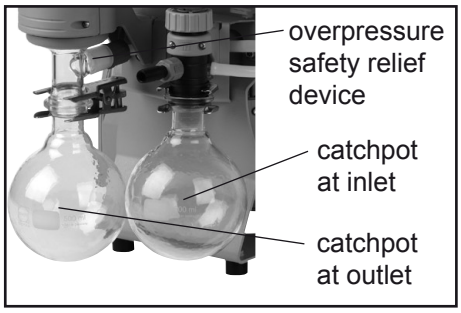
Avoid throttling losses by using connecting pipes with large diameter and by keeping them as short as possible.
In case of perturbing exhaust noise connect an exhaust hose or use a silencer (see ”Accessories”). Install outlet pipelines always falling to avoid backflow of condensate towards the pump.
Use of a suitable valve to isolate the pump from the vacuum system is recommended to allow the pump to warm up before pumping condensable vapours or to clean the pump before it is switched off.
When assembling, ensure **vacuum-tightness**. After assembly, check the whole system for leaks.
Secure hose connections at the pump appropriately against accidental detaching.

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Separator (inlet) and exhaust waste vapour condenser (outlet)

Assembling the hose nozzle with union nut:

- ➨ Take the hose nozzle with attached compression ferrule and union nut out of the round bottom flask and put onto inlet connection (version 2 AK: onto inlet and outlet connections).
- ➨ Tighten the union nut by hand until you can feel the stop. Then tighten an additional 1/4 rotation with an open-ended wrench size 17 for final installation.



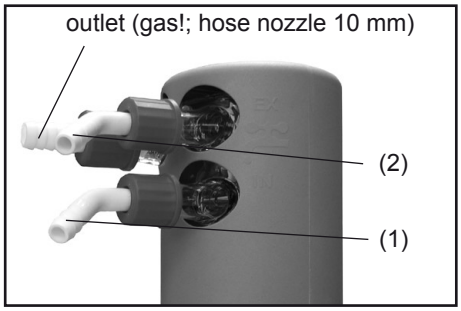
Catchpots:

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 catchpots 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 (1) and coolant outlet (2) 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.

NOTICE

Attach the pipelines of the coolant circuit to the respective hose nozzles (hose nozzles 6-8 mm, 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.

⚠CAUTION

- 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.
- If necessary connect the exhaust to a suitable treatment plant to prevent the discharge of dangerous gases and vapours to the surrounding atmosphere.
- **Attention**: Install hoses of the cooling system in a way to avoid flow / dropping of condensed water onto the pumping unit (especially cables and electronic parts).
- 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). Backflow always pressureless.
- 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).
- Install an optional coolant valve always in the supply line of the exhaust waste vapour condenser only.

During operation

⚠CAUTION

- **Maximum ambient temperature**: 40 °C
- Make sure ventilation is adequate especially if the pump is installed in a housing or if the ambient temperature is elevated.
- **Potentially dangerous gases or vapours** at the outlet of the pump have to be drained and disposed of appropriately.
- Due to the high compression ratio of the pumps, the pressure at the outlet port might get higher than the maximally permitted pressure compatible with the **mechanical stability** of the system. Ensure that the pump outlet is not blocked or restricted.

NOTICE

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

If the pump is installed in altitudes of more than 1000 m above mean sea level check compatibility with applicable safety requirements, especially IEC 60034 (motor might overheat due to insufficient cooling).
Do not start the pump if the **pressure at outlet port** exceeds **maximum 1.1 bar (absolute)**. Attempts to start the pump at higher pressures may cause blockade and damage of the motor.
Check compatibility with **maximally permitted pressure** at inlet and outlet.

Prevent internal condensation, transfer of liquids or dust. The diaphragms and valves will be damaged, if liquids are pumped in significant amounts.
Check the pump regularly for external soiling and deposits, clean if necessary to avoid an increase of the pump‘s operating temperature.

Pumps with flow control diaphragm:
Use the flow control diaphragm at the pump inlet to control the pumping speed. Open flow control diaphragm to pump down.

➨ Opening the flow control diaphragm: Do not turn further than to the first resistance (turning getting tight).
➨ Closing: Close flow control diaphragm only slightly hand-tight.
☞ **Attention**: Non-oberservance may cause damage of the diaphragm or the flow control diaphragm may not close properly anymore.
➨ Replace diaphragm in case of leaking.

In case of excess temperature, the motor is shut down by a **thermal cutout** in the winding. Attention: Reset possible only manually. Switch off the pump or isolate the equipment from mains. Determine and eliminate the cause of failure. 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 might lead to a dangerous situation.

A warm up period (approx. 15 min.) is required to ensure that the rated ultimate vacuum and pumping speed are attained. Avoid high heat supply (e. g. due to hot process gases).

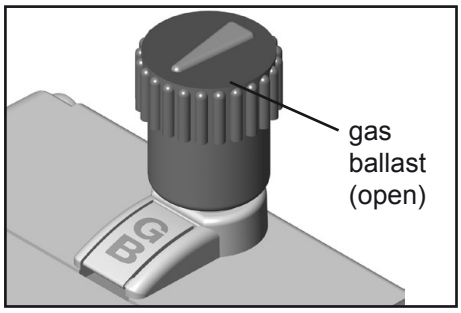
Attention: Important notes regarding the use of gas ballast

⚠ DANGER

➨ When using air rather than inert gas, risk of significant damage to equipment and/or facilities, risk of personal injury or even loss of life exists due to the formation of hazardous and/or explosive mixtures if air and pumped media react inside or at the outlet of the pump.

⚠WARNING

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



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

- ☞ Do not pump vapour before pump has reached its operating temperature. Open gas ballast valve when pumping condensable vapours.
- ☞ The gas ballast valve is open, if the arrow on the gas ballast cap is pointing towards the labelling ”GB”.
- ☞ With gas ballast valve open, the ultimate vacuum will be reduced.
- ☞ Use inert gas for gas ballast to avoid the formation of explosive mixtures.
- ☞ Close the gas ballast valve by turning the cap 180°.

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

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

⚠WARNING

- ☞ 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.
- ☞ Ensure that the **coolant outlet pipeline** is always free and that it cannot get blocked.

⚠CAUTION

- Check the overpressure safety relief device at the exhaust waste vapour condenser regularly, replace if necessary. Check especially for conglutination and cracks.

- 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).
- Install optional coolant valves always in the supply line of the waste vapour condenser only.
- Avoid overpressure in the coolant circuit (e.g. caused by blocked or squeezed coolant hoses).

- In case of **condensation**: Check liquid level in both catchpots during operation. Avoid overflowing of the catchpots. Install a level sensor (order-no. 699908) for monitoring if necessary (VACUUBRAND controller CVC 3000 or VNC 2 is required).

NOTICE

Do not allow the catchpots to get overfilled. Maximum liquid level approx. 80% to avoid problems when removing the catchpots.
Check liquid level in both catchpots regularly and drain catchpots in time. In case, install level sensor (see “Accessories“).

Permissible range of coolant temperature at the exhaust waste vapour condenser: -15°C to +20°C

Check hose connections prior to starting operation of the cooling system.
Check coolant hoses regularly during operation.

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Removing the catchpots:
Catchpot at outlet:
Remove joint clip, remove catchpot and drain condensate.

Catchpot at inlet:
Admit air or inert gas (via pump inlet) to atmospheric pressure. Remove joint clip, remove catchpot and drain condensate.

➨ Reassemble drained catchpots.

Important: Comply with regulations when disposing of solvents/condensates. Re-use if possible, purify if contaminated.

Shutdown

NOTICE

Short-term:
Has the pump been exposed to condensate?
Allow the pump to continue to run at atmospheric pressure for a few minutes.
Has the pump been exposed to media which may damage the pump materials or form **deposits**?
Check and clean pump heads if necessary.

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

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Accessories



Digital vacuum gauge DVR 2 ..... **682902**

Vacuum hose (caoutchouc) 10 mm ID **686002**
Silencer for hose nozzle DN 10 mm **636588**

Attention: Dust-laden gases, deposits and condensed solvent vapour can restrict air flow out the silencer. The resultant back pressure can lead to damage of pump bearings, diaphragms, and valves. Under those conditions, a silencer must not be used.

Non return valve (flapper valve) **639683**
(Simultaneous operation of two systems at different pressure levels,
stainless steel/FFKM, leak rate < 10^{-3} mbar*l/s for pressure differences ≥ 500 mbar.)

Upgrade possibilities for NT vacuum systems:

Upgrade kit SYNCHRO to two inlets (valve block; replaces distribution head) **699920**
Adapter G 1/4 to PTFE tubing 10/8 mm, for inlet at valve block (SYNCHRO) **677060**
Small flange KF DN 16 for assembly at inlet of valve block (SYNCHRO) **662593**
Seal ring for small flange KF DN 16 (662593)..... **3120565**
Hose nozzle DN 6/10 mm, for inlet at valve block (SYNCHRO) **642470**
Modification kit for small flange KF DN 16 at inlet of distribution head..... **699939**
Hose nozzle DN 6/10 mm, for inlet at distribution head..... **636635**
Elbow piece (90°) for PTFE tubing DN 10/8 mm..... **637873**
for assembly at inlet of distribution head
Blind flange (C1) for assembly at valve block or distribution head **677136**
Flow control diaphragm (C2) for assembly at valve block or distribution head **677137**
Solenoid operated valve (C3-B) for assembly at valve block or distribution head..... **636668**
Manometer module(C5) for assembly at valve block or distribution head..... **677100**
Controller CVC 3000 ..... **683160**
In-line valve VV-B 6C **674291**
Level sensor (control of liquid level in catchpots) **699908**

Ways to connect NT chemistry diaphragm pumps:

Small flange KF DN 16, with hose - for installation at hose nozzle..... **677058**
Small flange KF DN 16, for assembly directly at the valve head **699918**
(at inlet of ME 4C NT / ME 8C NT / MD 4C NT; at outlet of ME 4C NT / MZ 2C NT)
Small flange KF DN 16, for assembly directly at the valve head **699919**
(at outlet of ME 8C NT / MD 4C NT)
Adapter to PTFE tubing DN 10/8 mm, for assembly directly at the valve head..... **636274**
(at inlet of ME 4C NT / ME 8C NT / MD 4C NT; at outlet of ME 4C NT / MZ 2C NT)
Adapter to PTFE tubing DN 10/8 mm, for assembly directly at the valve head..... **636275**
(at inlet of MZ 2C NT; at outlet of ME 8C NT / MD 4C NT)
Elbow connecting piece (90°) for PTFE tubing DN 10/8 mm..... **638434**
T-piece for PTFE tubing DN 10/8 mm **638435**
PTFE tubing DN 10/8 mm (sold by meter)..... **638644**

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

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Troubleshooting

Fault	Possible cause	Remedy
❑ Pump does not start or stops immediately.	➡ Mains not plugged in, electrical supply failure?	✓ Plug in mains. Check fuse.
	➡ Device fuse blown?	✓ Identify cause of failure. Replace device fuse.
	➡ Pressure in outlet pipeline too high?	✓ Remove blockade in line, open valve.
	➡ Motor overloaded?	✓ Allow motor to cool down, identify and eliminate cause of failure. Manual reset is necessary. Switch off pump or unplug mains.
❑ Pump does not achieve its ultimate vacuum or usual pumping speed.	➡ Centring ring at small flange connection not correctly positioned or leak in the pipeline or vacuum system?	✓ Check pump directly - connect vacuum gauge directly at pump inlet - then check connection, pipeline and vacuum system if necessary.
	➡ Long, narrow line?	✓ Use lines with larger diameter, length as short as possible.
	➡ Pump has been exposed to condensate?	✓ Allow pump to run for some minutes with atmospheric pressure at the inlet.
	➡ Deposits have been formed inside the pump?	✓ Clean and inspect the pump heads.
	➡ Diaphragms or valves damaged?	✓ Replace diaphragms and/or valves.
	➡ Outgassing substances or vapour generated in the process?	✓ Check process parameters.
❑ Pump too noisy.	➡ Loud exhaust noise?	✓ Connect hose or silencer to pump outlet.
	➡ Diaphragm crack or diaphragm clamping disc loose?	✓ Perform maintenance.
	➡ Other than above mentioned causes?	✓ Contact local distributor.
❑ Pump seized.		✓ Contact local distributor.

NOTICE

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

☞ The service manual is intended for trained service people only.

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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.

⚠WARNING



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

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

⚠CAUTION

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

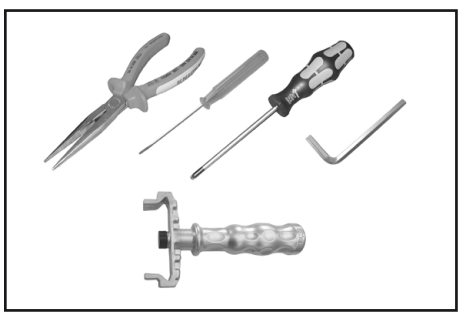
NOTICE

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

Set of seals for **ME 4C NT** **696864**
Set of seals for **MZ 2C NT / PC 201 NT** **696869**
Set of seals for **MD 4C NT / PC 201 NT** **696870**
Set of seals for **ME 8C NT** **696867**
Diaphragm key (w/f 66) **636554**

☞ **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):

- Torx screw driver TX20
- Hex key size 5
- Flat-bladed screw driver 2.5 mm
- Flat pliers
- Diaphragm key w/f 66

Cleaning and inspecting the pump heads

The replacement of the diaphragm and the replacement of the valves can be carried out separately.

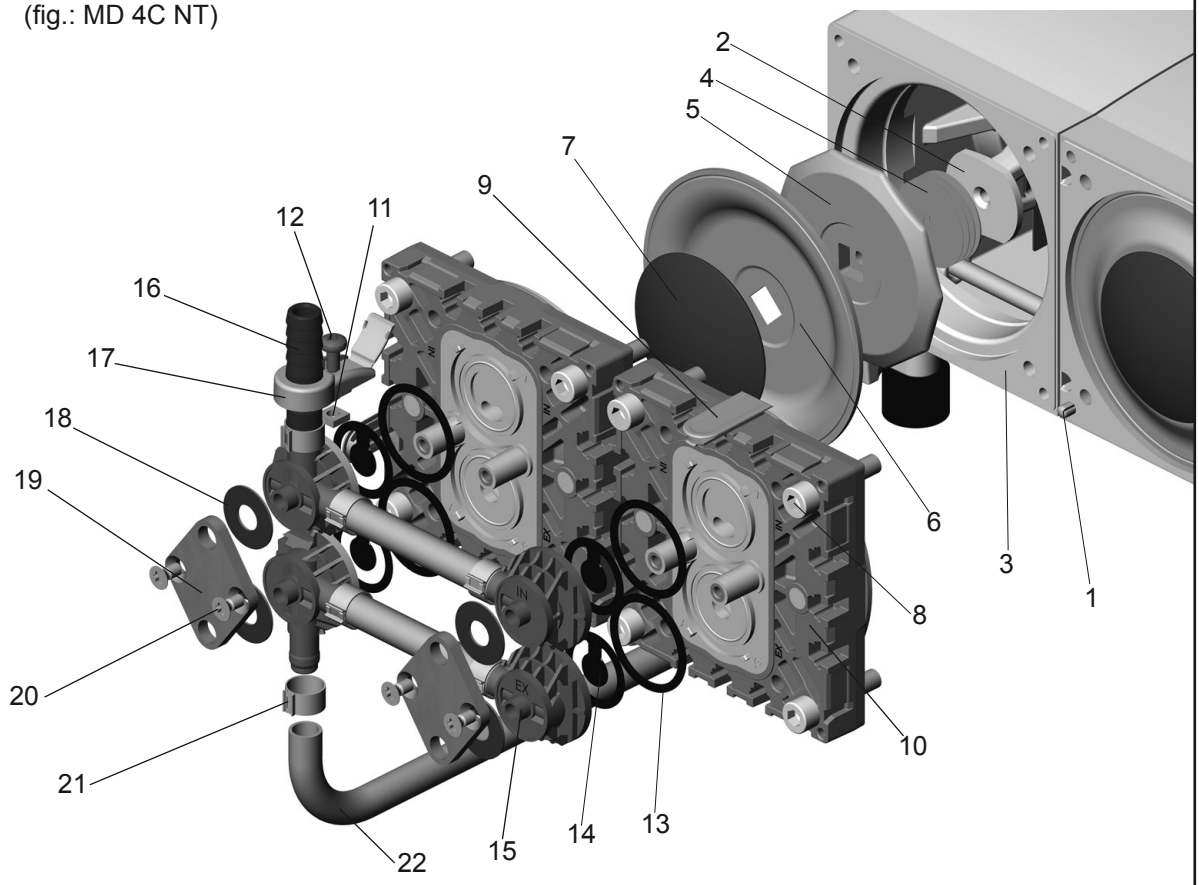
☞ To replace the valves, remove the head covers of one side of the pump conjointly with the assembled valve heads and fittings.

☞ To maintain the diaphragms, the valve heads and the fittings don't have to be disassembled. The head covers can be removed conjointly with the assembled valve heads and fittings.

☞ Maintain only one side of the pump at a time.

View of the disassembled pump head parts

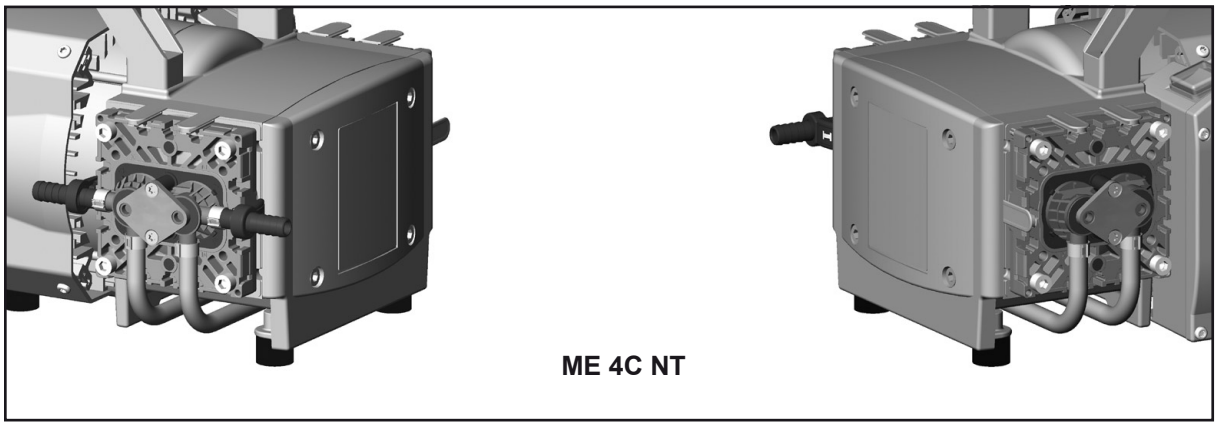
(fig.: MD 4C NT)



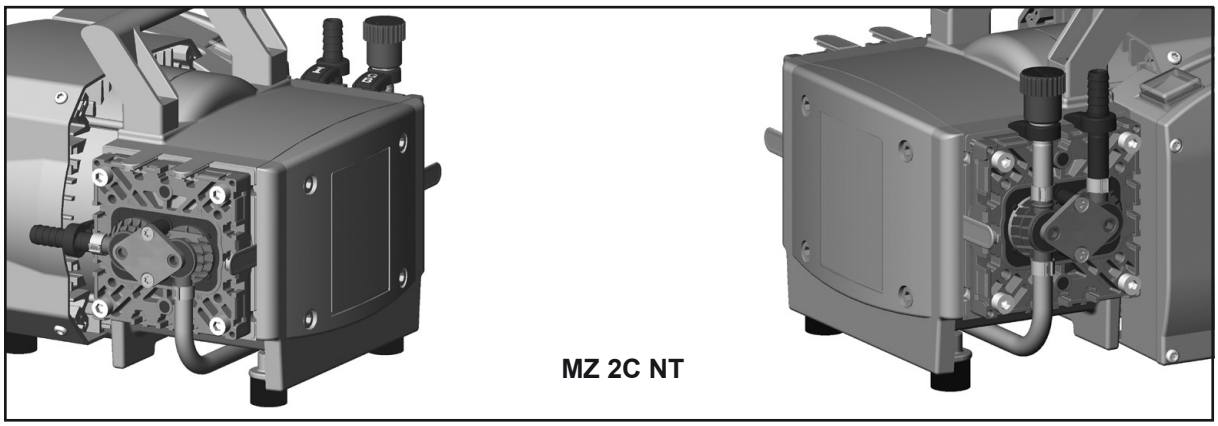
1: Cylinder pin / mark
2: Connecting rod
3: Housing
4: Washer
5: Diaphragm support disc
6: Diaphragm
7: Diaphragm clamping disc with square head screw
8: Socket head screw
9: Blind
10: Head cover
11: Square nut
12: Fillister head screw
13: O-ring
14: Valve
15: Valve head
16: Hose nozzle
17: Connection fastener with hinged cover
18: Disc spring
19: Clamping bracket
20: Countersunk screw
21: Hose clip
22: Connection tube

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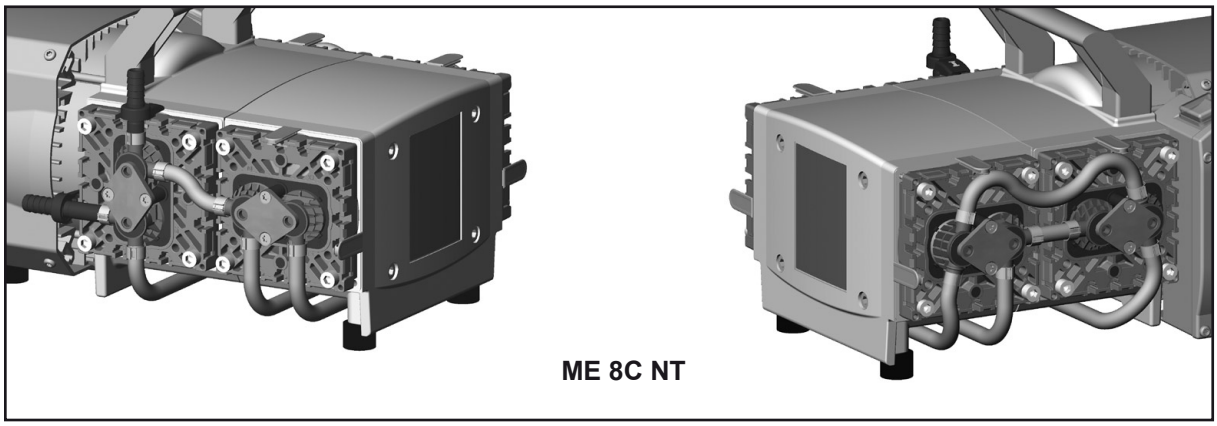
Fittings and tubing of the different pump models:



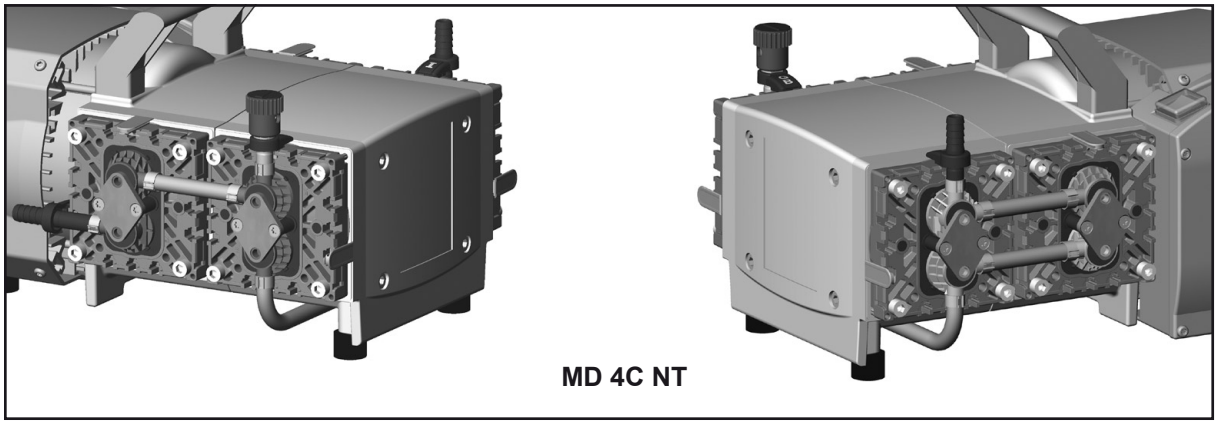
ME 4C NT



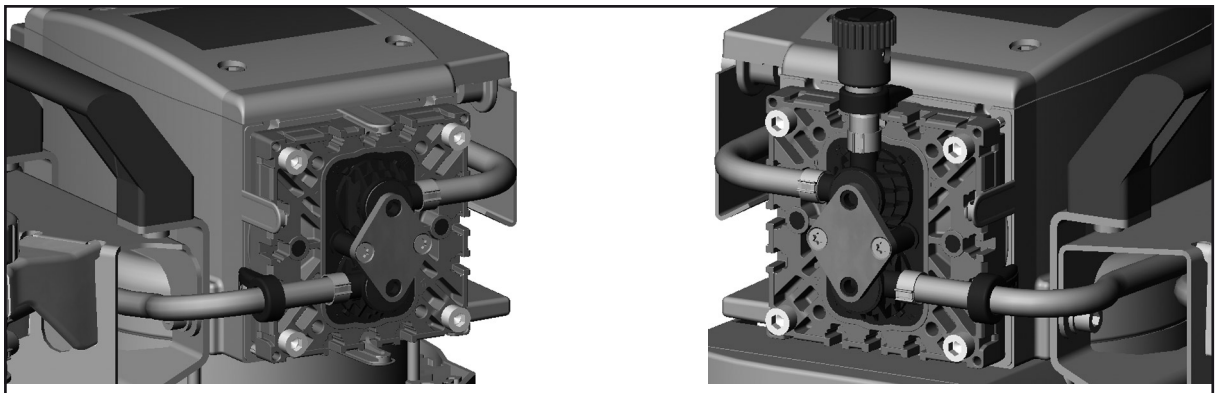
MZ 2C NT



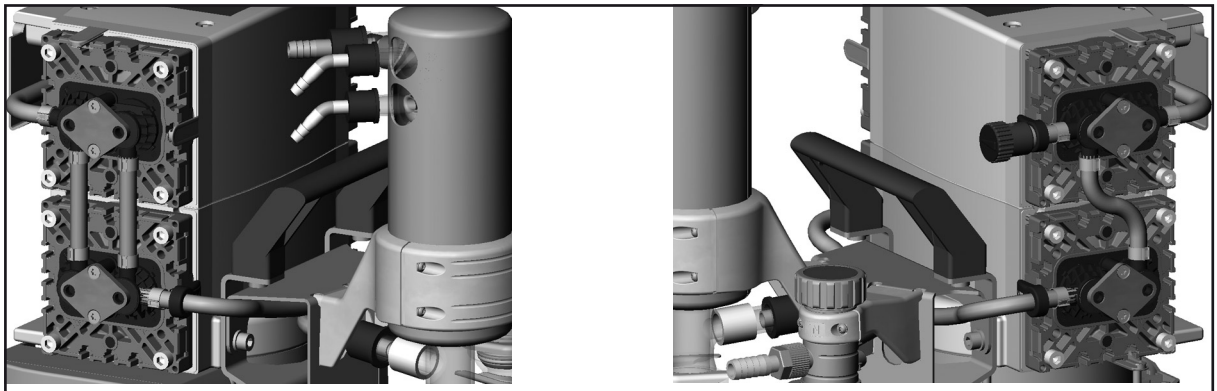
ME 8C NT



MD 4C NT



MZ 2C NT 2AK / MZ 2C NT AK + EK / MZ 2C NT AK SYNCHRO + EK / PC 101 NT



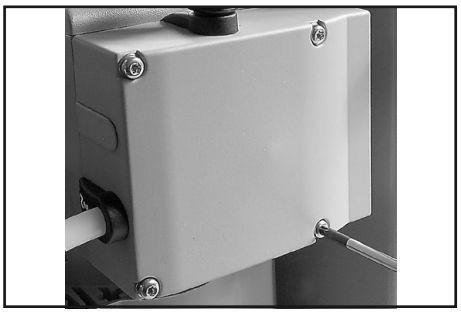
MD 4C NT 2AK / MD 4C NT AK + EK / MD 4C NT AK SYNCHRO + EK / PC 201 NT

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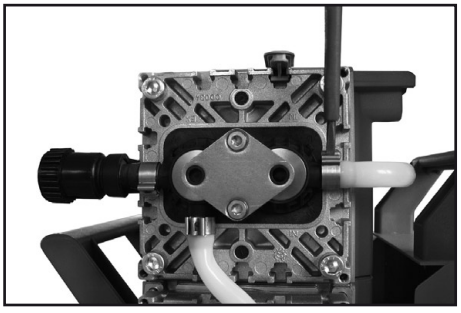
Pump at pump support:

➨ Remove catchpots at inlet and outlet (see ”Use and operation”).



➨ Use a Torx screw driver TX20 to unscrew the 4 screws fixating the head cover cowling. Pay attention to the washers under the screws and remove.

➨ Pull off head cover cowling carefully. Do not cant.



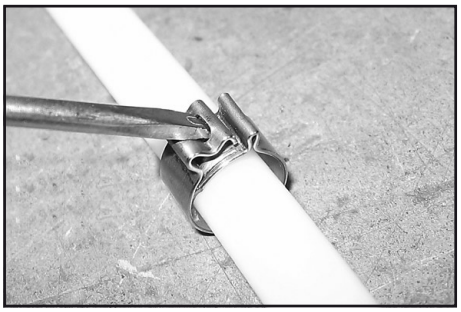
Detach the fixing of the connection tube to the other side of the pump at the valve head.

Pump at pump support:

Detach the fixing of the connection tube to the other side of the pump as well as the hose connection to the inlet/outlet of the vacuum system at the valve head.

➨ Open the hose clip with a flat-bladed screw driver.

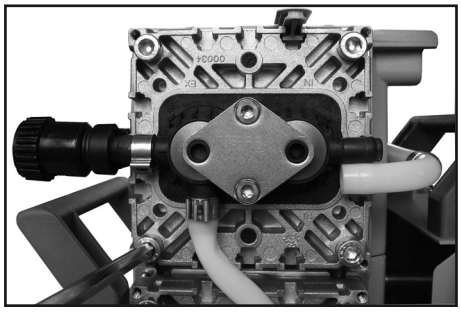
➨ Pull the tubing off the hose connector.



Opening the hose clip:

➨ Apply screw driver as shown and turn.

Replacing the diaphragm

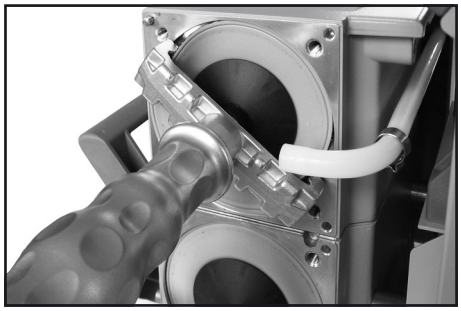


➨ Disassemble head covers to check the diaphragm.

➨ Unscrew four (pump with two cylinders) or eight (pump with four cylinders) socket head screws with a hex key size 5 and remove both head covers (pumps with two cylinders: only one head cover) together with valve heads and connections.

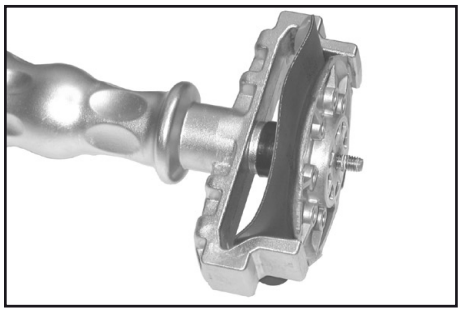
☞ It is not necessary to disassemble the valve heads, the connection fasteners, or the hose connection between the adjacent head covers (pumps with four cylinders).

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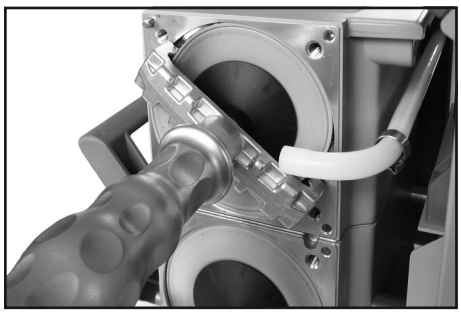


☞ Check diaphragm for damage and replace if necessary.
➨ Lift diaphragm carefully sidewise.
☞ Never use a spiky or sharp-edged tool to lift the diaphragm.
➨ Use the diaphragm key to grip the diaphragm support disc below the diaphragm.
➨ Unscrew diaphragm support disc with diaphragm and diaphragm clamping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

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



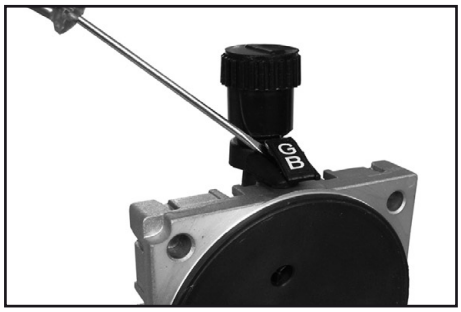
➨ Position new diaphragm between diaphragm clamping disc with square head screw and diaphragm support disc.
☞ Attention: Position diaphragm with pale side towards diaphragm clamping disc (to pump chamber).
☞ Make sure that the square head screw of the diaphragm clamping disc is correctly seated in the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



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

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Replacing the valves



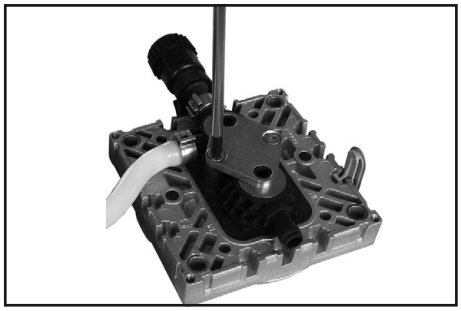
➨ Open the hinged cover of the connection fastener with a flat-bladed screw driver.



Loosen connection fastener slightly.

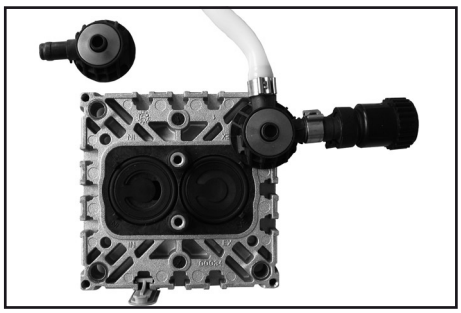
➨ Turn the fillister head screw with a Torx screw driver TX20 one turn at most.

☞ Do not detach the fillister head screw from the square nut.



Loosen the clamping brackets on the valve heads.

➨ Unscrew at each clamping bracket the two countersunk screws with a Torx screw driver TX20. Remove the clamping brackets.



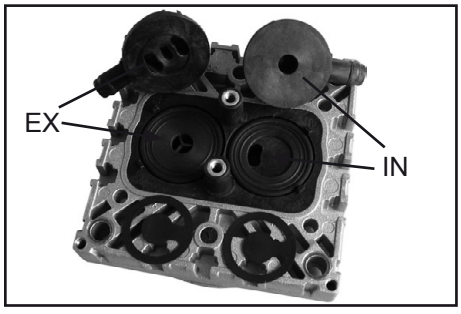
➨ Remove valve heads conjointly with disc springs, connection tube if applicable, hose nozzles and connection fasteners or move the valve heads carefully aside. Note position and orientation of the valve heads.

☞ Note position of valves.

➨ Check valves and O-rings for damages and soiling.

➨ Replace valves or O-rings if necessary.

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

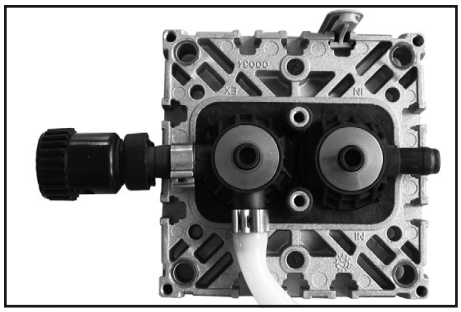


➨ Insert O-rings and valves. See figure for the correct position of the valves:

☞ **Inlet side** (IN):
Marked ”IN” next to the valve seat. The valve tongue points at the reniform orifice in the valve seat.

☞ **Outlet side** (EX):
Marked with ”EX” next to the valve seat. The valve is oriented the same way as the valve at the inlet side.

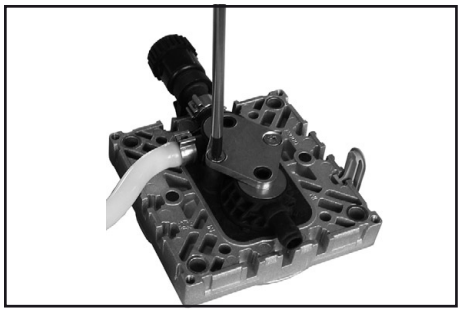
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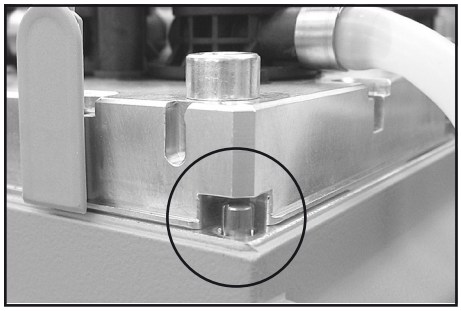
- ➨ Position valve heads, if applicable with hose nozzle, connection tube or connection fastener, and disc springs on the valve seats. Position disc springs with camber upwards. Pay attention to the correct orientation of the valve heads.
- ☞ Centre the valve head with respect to the valve seat. The valve head must lie plane within the noses of the valve seat.

Valve head with gas ballast or hose nozzle connection:

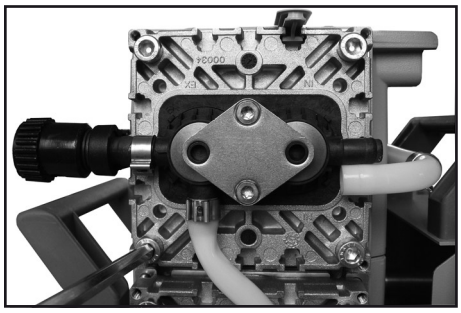
- ➨ Insert square nut in the groove of the head cover or position square nut in the groove and screw on connection fastener afterwards.
- ☞ Fix fillister head screw only slightly.



- ➨ Position clamping bracket with countersunk bores upwards.
- ➨ Align the countersunk bores with the threaded pegs.
- ➨ Fasten the countersunk screws slightly and correct the alignment of the valve heads if necessary.
- ➨ Tighten countersunk screws with Torx screw driver TX20.
- ☞ Torque: 3 Nm.



- ➨ Bring the diaphragms into a position in which they are in contact with the housing and centred with respect to the bore.
- ➨ Put on head cover with valve heads and connections.
- ☞ Pay attention to the correct orientation of the head covers: Housing with cylinder pin: The cylinder pin at the pump housing has to fit into the recess at the head cover. Housing with mark: Align the recess at the head cover with the mark at the pump housing.



- ➨ Screw in the socket head screws at the head covers diagonally first slightly with a hex key size 5, then tighten.
- ☞ Recommended torque: 12 Nm.

- ➨ Slot the blinds into the head cover.



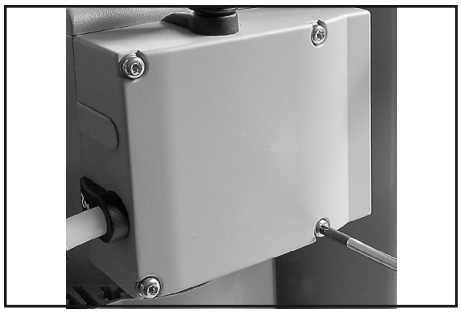
Fix the connection tube to the other side of the pump at the valve head.

Pump at pump support:

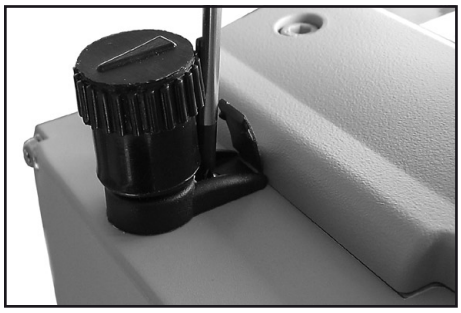
Fix the connection tube to the other side of the pump as well as the hose connection to the inlet/outlet of the vacuum system at the valve head.

- ➨ Slip connecting tube onto hose connection of valve head.
- ➨ Slide on the tube and the hose clip until touching the nose at the valve head.
- ➨ Close hose clip with flat pliers.

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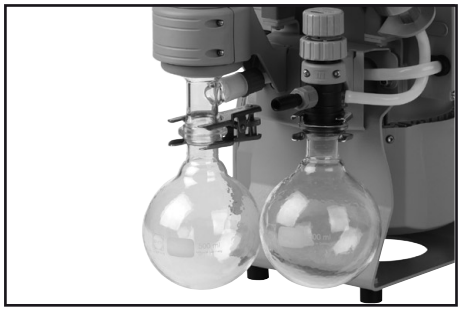


- Put head cover cowling on.
- Slide the head cover cowling in the grooves of the blinds and under the connection fasteners.
- Install the washers. Use a Torx screw driver TX20 to screw in the 4 screws fixating the head cover cowling.



- Tighten the fillister head screws of the connection fasteners with a Torx screw driver TX20.
- Close the hinged covers.

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



Pump at pump support:

- Assemble catchpots with joint clips.

If the pump does not achieve the ultimate vacuum:

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

If the specified ultimate vacuum is not achieved and if this does not change after the run-in period:
Check hose connectors at pump head for leaks. If necessary recheck valve seats and pump chambers.

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Replacing the device fuse

WARNING

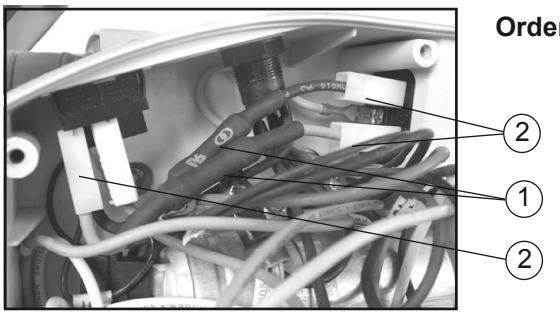


The replacing of the device fuse has to be carried out by an **electrician**. Switch off the pump and disconnect it from mains before opening the terminal box. After disconnecting from mains wait two minutes to allow the capacitors to discharge. After replacing the fuse, the pump must be checked for electric safety (see below)! Identify and eliminate the cause of failure before switching on the pump again.



The pigtail fuses are built-in in wires (1, black and blue) inside the terminal box. To replace the fuses it is necessary to replace the wires completely (fixed with flat pin bushes (2)).

➨ Open the terminal box. Unscrew the four screws with a Torx screw driver TX20 and remove the terminal box cover. Remove both wires with built-in fuses (fixed with flat pin bushes (2), see figure). Mount the new wires (flat pin bushes) and close the terminal box. Fasten the cover with the four screws.



Order-no. Set of fuses NT.....**636542**

WARNING

Important: Check operability and safety of the pump after repair and after replacing the device fuse.

Check the electrical safety (protective conductor resistance, insulating resistance, high voltage test) according to IEC 61010 and national regulations.

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Notes on return to the factory

Repair - return - DKD calibration

NOTICE

Safety and health of our staff, laws and regulations regarding the handling of dangerous goods, occupational health and safety regulations and regulations regarding safe disposal of waste require that for all pumps and other products the **"Health and safety clearance form"** must be 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.

⚠CAUTION

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

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

To expedite repair and to reduce costs, please enclose a detailed description of the problem and the product´s operating conditions with every product returned for repair.
We submit **quotations** only on request and always at the customer´s expense. If an order is given, the costs incurred are offset from the costs for repair or from the purchase price, if the customer prefers to buy a new product instead of repairing the defective one.

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

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

NOTICE

Before returning the equipment ensure that (if applicable):

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

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

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

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

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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 sent to our office duly completed and signed before any equipment is dispatched to our premises. **Products will not be accepted for any procedure, and handling and repair / DKD calibration will not start before we have received this declaration.**

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 information 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 been pumped or been in contact with the product are listed in 3.1, that the information is complete and that we have not withheld any information.
- the product, in accordance with regulations, has been
  ❑ 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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-Technology for Vacuum Systems-
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CE

Konformitätserklärung
Declaration of conformity
Déclaration de conformité

Membranpumpe / Diaphragm pump / Pompe à membrane

ME 4C NT (230V; 731200, 731201, 731202)
MZ 2C NT (230V; 732300, 732301, 732302)
ME 8C NT (230V; 734200, 734201, 734202)
MD 4C NT (230V; 736400, 736401, 736402)

Hiermit erklären wir, dass das oben bezeichnete Gerät in Konzeption und Bauart sowie in der von uns in Verkehr gebrachten Ausführung den grundlegenden Anforderungen der zutreffenden, aufgeführten EU-Richtlinien entspricht. Bei einer mit uns nicht abgestimmten Änderung an dem Gerät verliert diese Erklärung ihre Gültigkeit.
We herewith declare that the product designated above is in compliance with the basic requirements of the applicable EC-directives stated below with regard to design, type and model sold by us. This certificate ceases to be valid if the product is modified without the agreement of the manufacturer.
Par la présente, nous déclarons que le dispositif désigné ci-dessus est conforme aux prescriptions de base des directives EU applicables et indiqués en ci que concerne conception, dessin et modèle vendu par nous-mêmes. Cette déclaration cesse d´être valable si des modifications sont apportées au dispositif sans notre autorisation préalable.

Maschinenrichtlinie (mit Änderungen) / Machine directive (with supplements) / Directive Machines (avec des suppléments)
2006/42/EG
Niederspannungsrichtlinie / Low-Voltage Directive / Directive Basse Tension
2006/95/EG
Richtlinie Elektromagnetische Verträglichkeit / Electromagnetic Compatibility Directive / Directive Compatibilité Electromagnétique
2004/108/EG
Angewandte Harmonisierte Normen / Harmonized Standards applied / Normes Harmonisées utilisées
DIN EN 12100-2, DIN EN 61010-1, DIN EN 1012-2, DIN EN 61326-1
Managementsysteme / Management systems / Systèmes de Management
EN ISO 9001, EN ISO 14001 (1997-2006)

Wertheim, 16.05.2008
. . . . . .
Ort, Datum / place, date / lieu, date

. . . . . .
(Dr. F. Gitmans)
Geschäftsführer / Managing Director / Gérant

ppa. . . . . .
(Dr. J. Dirscherl)
Technischer Leiter / Technical Director / Directeur technique

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-Technology for Vacuum Systems-
-Technologie pour système à vide-
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MZ 2C NT + 2 AK (230V; 732500, 732501, 732502)
MZ 2C NT + AK + EK (230V; 732600, 732601, 732602)
MZ 2C NT + AK + M + D (230V; 732700, 732701, 732702)
MZ 2C NT + AK SYNCHRO + EK (230V; 732800, 732801, 732802)
PC 101 NT (230V; 733000, 733001, 733002)

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Angewandte Harmonisierte Normen / Harmonized Standards applied / Normes Harmonisées utilisées
DIN EN 12100-2, DIN EN 61010-1, DIN EN 1012-2, DIN EN 61326-1
Managementsysteme / Management systems / Systèmes de Management
EN ISO 9001, EN ISO 14001 (1997-2006)

Wertheim, 16.05.2008
. . . . . .
Ort, Datum / place, date / lieu, date

. . . . . .
(Dr. F. Gitmans)
Geschäftsführer / Managing Director / Gérant

ppa. . . . . .
(Dr. J. Dirscherl)
Technischer Leiter / Technical Director / Directeur technique

VACUUBRAND GMBH + CO KG
-Vakuumtechnik im System-
-Technology for Vacuum Systems-
-Technologie pour système à vide-
Alfred-Zippe-Str. 4 - 97877 Wertheim
Tel.: +49 9342 808-0 - Fax: +49 9342 808-450
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CE

Konformitätserklärung
Declaration of conformity
Déclaration de conformité

Membranpumpe / Diaphragm pump / Pompe à membrane

MD 4C NT + 2 AK (230V; 736600, 736601, 736602)
MD 4C NT + AK + EK (230V; 736700, 736701, 736702)
MD 4C NT + AK SYNCHRO + EK (230V; 736800, 736801, 736802)
PC 201 NT (230V; 737000, 737001, 737002)

Hiermit erklären wir, dass das oben bezeichnete Gerät in Konzeption und Bauart sowie in der von uns in Verkehr gebrachten Ausführung den grundlegenden Anforderungen der zutreffenden, aufgeführten EU-Richtlinien entspricht. Bei einer mit uns nicht abgestimmten Änderung an dem Gerät verliert diese Erklärung ihre Gültigkeit.
We herewith declare that the product designated above is in compliance with the basic requirements of the applicable EC-directives stated below with regard to design, type and model sold by us. This certificate ceases to be valid if the product is modified without the agreement of the manufacturer.
Par la présente, nous déclarons que le dispositif désigné ci-dessus est conforme aux prescriptions de base des directives EU applicables et indiqués en ci que concerne conception, dessin et modèle vendu par nous-mêmes. Cette déclaration cesse d´être valable si des modifications sont apportées au dispositif sans notre autorisation préalable.

Maschinenrichtlinie (mit Änderungen) / Machine directive (with supplements) / Directive Machines (avec des suppléments)
2006/42/EG
Niederspannungsrichtlinie / Low-Voltage Directive / Directive Basse Tension
2006/95/EG
Richtlinie Elektromagnetische Verträglichkeit / Electromagnetic Compatibility Directive / Directive Compatibilité Electromagnétique
2004/108/EG
Angewandte Harmonisierte Normen / Harmonized Standards applied / Normes Harmonisées utilisées
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Certificate

TÜVRheinland®

Certificate no. CU 72081689 01

License Holder:
VACUUBRAND GMBH + Co. KG
Alfred-Zippe-Str. 4

97877 Wertheim
Germany

Manufacturing Plant:
VACUUBRAND GMBH + Co. KG
Alfred-Zippe-Str. 4

97877 Wertheim
Germany

Test report no.: USA-DS 30882017 001 **Client Reference:** M. von Przychowski

Tested to: UL 61010A-1:2002 R12.02
CAN/CSA-C22.2 No. 1010.1-92+A2:97

Certified Product: Diaphragm Vacuum Pump for Laboratory Use **License Fee - Units**

Model Designation: Mw xyyy NT yy z, PC 101 NT, PC 201 NT 7
(w=E,Z,D,V; x=2,4,6,8; y=A-Z, blank;
z=+AK, +EK, +2AK, +AK+EK, +AK+EK TE, +AK+EK Peltronik,
+AK SYNCHRO+EK, +AK+M+D, +IK+EK, blank)

Rated Voltage: 1) AC 100V, 50/60Hz; 2) AC 120V, 60Hz
3,4) AC 230V, 50/60Hz;
5,6) AC 100-115V, 50/60Hz; AC 120V, 60Hz
7,8) AC 100-115/200-230V, 50/60Hz;AC 120V, 60Hz
Rated Current: 1) 5A; 2) 4A; 3) 3A; 4) 1.8A;
5) 5.7A; 6) 3.4A; 7) 5.7/3.0A, 5.7A; 8) 3.4/1.8A, 3.4A
Protection Class: I

7

Appendix: 1, 1-2

Licensed Test mark: TUV Rheinland of North America, Inc. C US

Signature

Dipl.-Ing. M. Glagla
QA Certification Officer

Date of Issue (day/mo/yr)
08/09/2008

TUV Rheinland of North America, Inc., 12 Commerce Road, Newtown, CT 06470, Tel (203) 426-0888 Fax (203) 426-4009

This certificate is only valid for pumps with the respective mark (Licensed Test mark) on the pump rating plate.

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