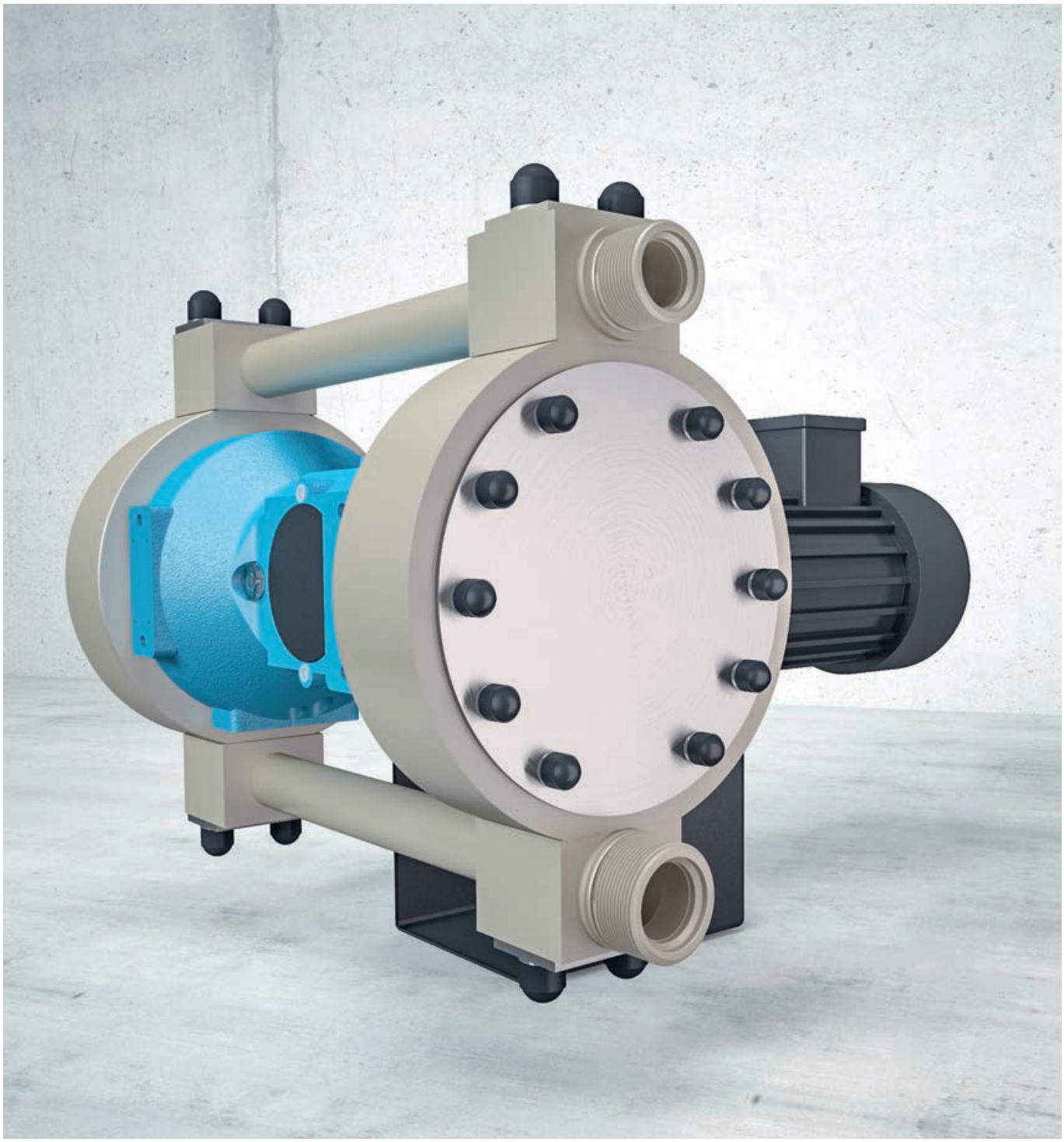
TECHNICAL MANUAL

FEEDING PUMP ZX...411.3...



TRANSLATION OF THE ORIGINAL TECHNICAL MANUAL! EN

PUMP TYPE

ZXM/ZXRI/ZXRF 411.3 - 2200e
ZXM/ZXRI/ZXRF 411.3 - 2600e
ZXM/ZXRI/ZXRF 411.3 - 3100e

NOTE

Record the exact type and serial number here ► can be read off the type plate on the pump.
These data are important in the case of queries or for ordering spare and/or wear parts and must always be stated.

TYPE:

SERIAL NO:

NOTE

Keep the operating manual for future use!

ATTENTION

Subject to technical modifications!

Quality notes

The **sera** quality management and quality assurance system is certified in accordance with DIN EN ISO 9001:2015.
The **sera** product complies with the applicable safety requirements and accident prevention regulations.

About this instructions

Special notes in these instructions are marked with text and danger symbols.

NOTE

Notes or instructions that faciliate work and ensure a safe operation.

ATTENTION

The non-observance of these safety instructions can result in malfunctions or material damages.

WARNING

The non-observance of these safety instructions can lead to material damages and personal injuries.

Note on the additional instructions „SAFETY INSTRUCTIONS“.

These technical manual is divided into the following main parts:

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WARNING

Observe and follow the safety instructions by all means.
See the additional instructions „SAFETY INSTRUCTIONS".
Man, machine and environment are endangered if the safety instructions are not observed.

SI01

General

sera products are checked for perfect condition and function previous to shipment.
Check for transport damage immediately after arrival of goods. If damage is found, this is to be reported immediately to the responsible carrier and the manufacturer.

Storage

An undamaged packaging protects the unit during storage and should only be opened when the product is installed.
Proper storage increases the service life of the product and includes prevention of negative influences such as heat, moisture, dust, chemicals etc.

The following storage specifications are to be obsered:

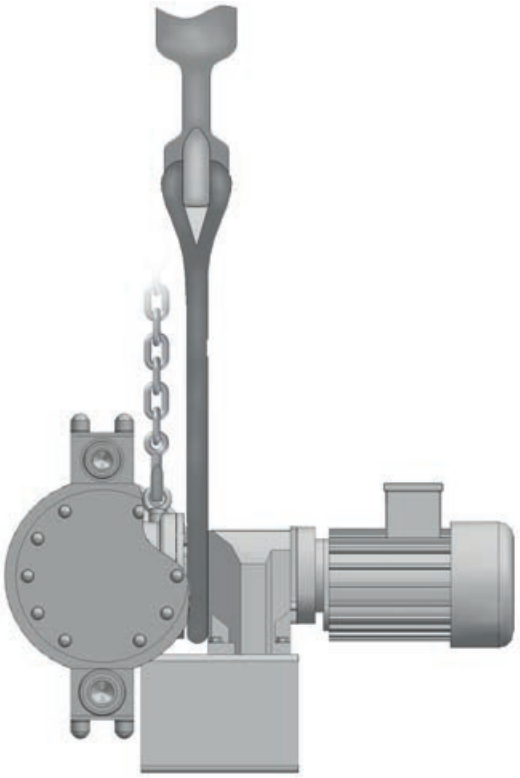
- Storage place: cool, dry, dustfree and slightly ventilated
- Storage temperature and relative air humidity see Chapter „TECHNICAL DATA".
- The maximum storage time for the standard packaging is 12 months.

If these values are exceeded, metal products should be sealed in foil and protected from condensation water with a suitable desiccant.

Do not store solvents, fuels, lubricants, chemicals, acids, disinfectants and similar in the storage room.

Transport

Select a hoist which is adapted to the weight of the pump and attach it to the motor flange and lifting screw of the pump.



Type key

1 — Type of drive (combinations possible)

C	controllable
M	not mechanically adjustable
R	mechanically adjustable
F	Motor suitable for frequency converter operation
i	Frequency converter, mounted on the motor
K	Stroke mechanism with side drive shaft and connected to the drive via a clutch
Z	twin design
X	Stroke mechanism with two opposite pump heads, combined suction and pressure side
Y	Stroke mechanism with two opposite pump heads

2 — Series

204	(solenoid driven pumps)
409	(motor driven pumps)
410	(motor driven pumps)
411	(motor driven pumps)

3 — Revision index

4 — max. Nominal capacity (litre/hour (each pump head))

5 — Displacer (type of construction)

e	Single diap hragm
ML	Multy-layer diaphragm
KM	Piston daphragm
K	Piston

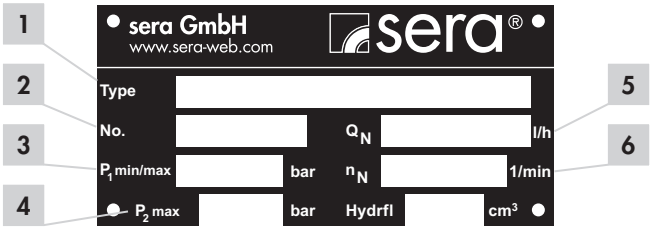
6 — Type of control

Pro+

1		2		3		4	5	6	
ZXRI		411	.	3	-	2200	e		*(example)*

Type plate

Each **sera** pump is factory provided with a type plate. The following information can be found on this type plate.



No.	Designation
1	Pump type
2	Serial number of the pump
3	Minimum/maximum permissible pressure in the pump inlet Minimum/maximum permissible pressure in the inlet cross section which the pump can be used for. Please consider that pressure depends on rotation speed, delivery rate, temperature and static pressure at the inlet.
4	Maximum permissible pressure in the pump outlet Maximum permissible pressure in the outlet cross section which the pump can be used for. Please consider that pressure depends on rotation speed, delivery rate, temperature and static pressure at the outlet.
5	Nominal delivery rate Delivery rate which the pump was ordered for, based on the nominal rotation speed nN, the nominal delivery height p2max. and the delivery medium stated in the supply contract.
6	Nominal stroke frequency

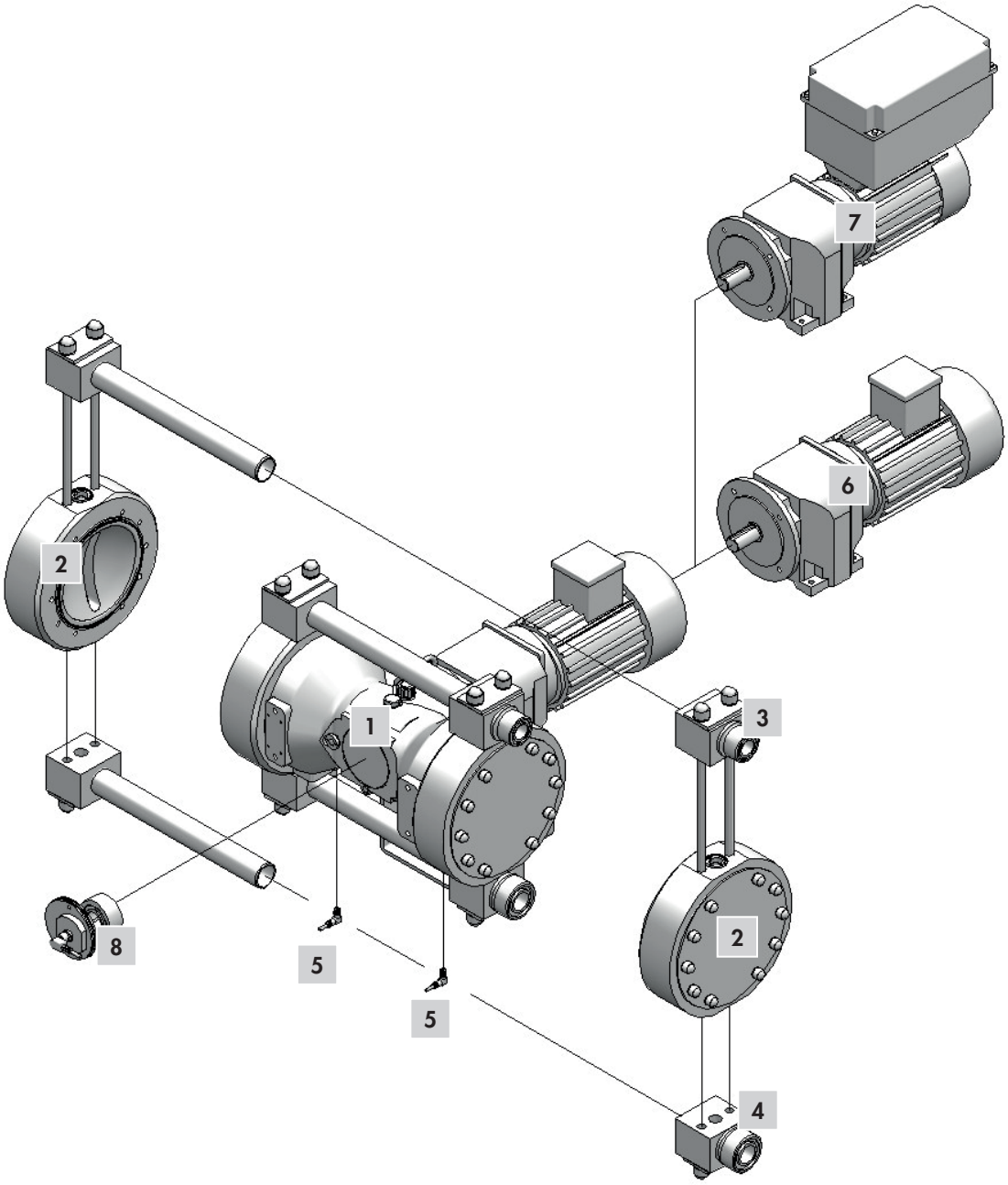
Notes attached to the product

Symbols which are directly attached to the pump, e.g. arrows for direction of rotation or symbols for fluid connections are to be observed and kept in legible condition.

Materials

The materials used are stated in the order confirmation and the product description.

Components



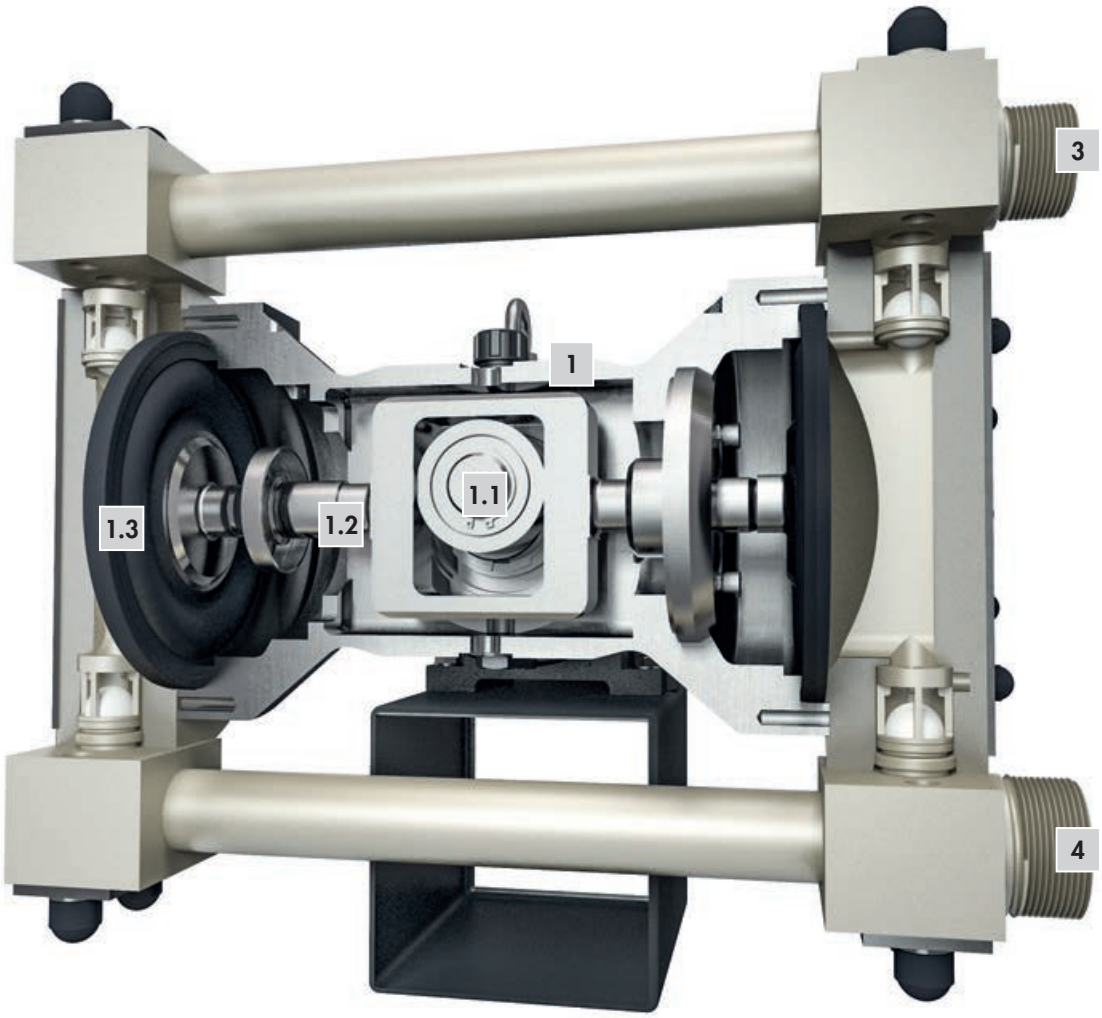
No.	Designation	Remark
1	Stroke mechanism	
2	Pump body	
3	Pressure valve	
4	Suction valve	
5	Diaphragm rupture monitoring device	option
6	Motor	
7	Motor mwith integrated frequency converter and potentiometer	option
8	Stroke frequency transmitter	
not illustrated	Motor for Ex-area *	option

* see enclosed documentation

Stroke mechanism (1)

With diaphragm pumps of this series the rotation of the drive motor is transferred to two opposite, rigidly coupled displacers via an eccentric (**1.1**) which is positively driven in the connecting rod.
The displacers - directly driven via the connecting rod – approach the suction and pressure stroke with a constant stroke length (offset by 180°).While one of the dosing heads sucks the medium in the other dosing head feeds it and vice versa.

The drive diaphragm (**1.3**) connected to the drive via the connecting rod (**1.2**) transmits the stroke movement directly to the pumped medium.

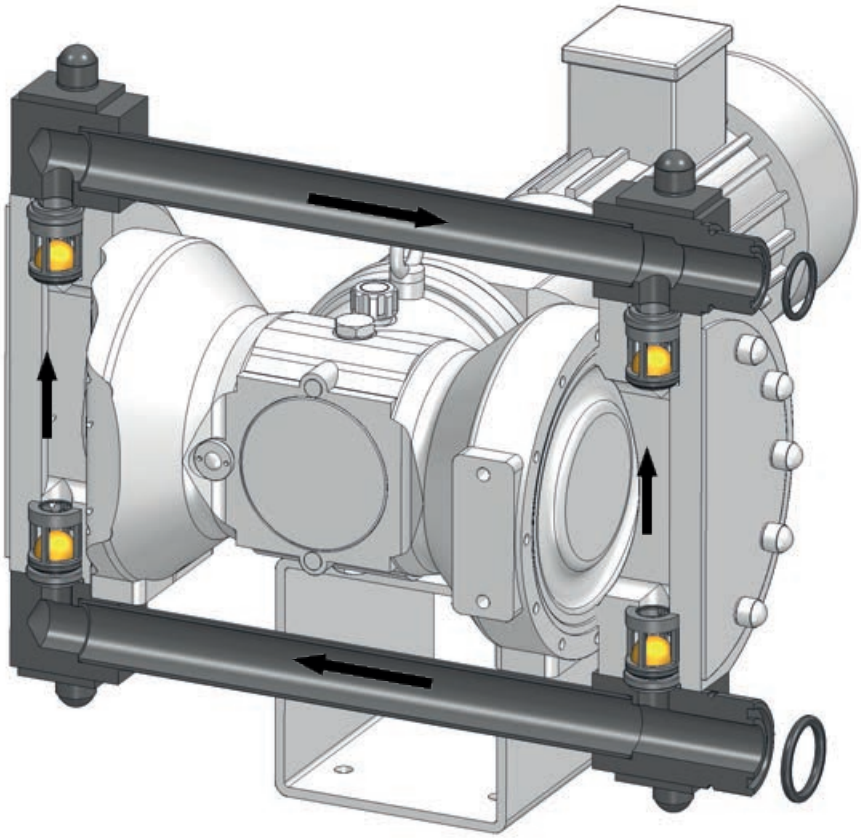


Pump body (2)

Depending on the applied backpressure, movements of the plastic pump body in elastic materials are possible.
This does not affect the pumps's service life or operational reliability.

Pressure valve / Suction valve (3/4)

The pump valves are always ball valves which can only func-tion properly when they are installed in a vertical position. The condition of the valves is decisive for the operational behaviour of the pump. The valves should only be exchanged completely. Pay attention to the flow direction when installing the valves.
The suction and pressure valves of the two pump heads are each brought together to a horizontal suction and pressure connection. The pump has a bigger connection at the suction side in order to improve the filling degree.



ATTENTION

Pressure valve above, suction valve below!

Diaphragm rupture monitoring device (5) (option)

sera pumps of the 411.3 series can be equipped with a conductive diaphragm rupture monitoring device as option.

ATTENTION

The pumped medium must have a minimum conductivity of at least 5 µS/cm!

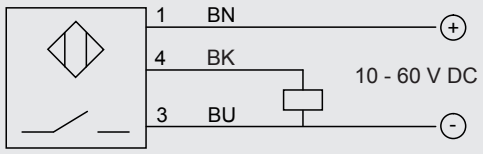
An electrode together with an approprate evaluation unit (option, e.g. **sera** diaphragm rupture relay, type ER-104 (or ER-142 for Ex-areas respectively) is used for monitoring. The diaphragm rupture electrode is mounted directly to the pump, the evaluation unit inside the switch cabinet.
The diaphragm rupture electrode type MBE-02 is not mounted by sera due to transport. We put the MBE-02 electrode onto the cable and fix it to the pump in a separate bag.
Put the diaphragm rupture electrode is in the base ring of the pump from below (see pig. „Components ...").

Stroke frequency transmitter (8) (option)

sera pumps are oscillating displacement pumps with an exactly defined stroke volume per each pump stroke.
If these dosing pumps should be used for automatic filling processes or charge dosing, then the single pump strokes must be determined and converted into electrical signals.
For this purpose, a stroke frequency transmitter (inductive contactor) is added to the pump (the option cannot mounted additionally) and reports each single pump stroke to the evaluation unit (e.g. preselection counter, SPC-control unit, etc.).

Technical data	
Rated voltage	10 - 60 V DC
Constant current	< 200 mA
Short circuit-proof:	
Connection mode	plug connector with 2 m cable
LED (green)	indicates supply voltage
LED (yellow)	indicates switching status

Wiring diagram



ATTENTION

When switching inductive loads (protectors, relays, etc.), surge protectors (varistors) must be fitted owing to the high self-induction voltage!

ATTENTION

When the pump is deployed in exlosion-hazardous areas a NAMUR type stoke frequency transmitter (II2G EExia IICT6, acc. to. ATEX95) is to be provided!

Drive motor

sera pumps 411.3 are driven by a three-phase motor.

Motor connection

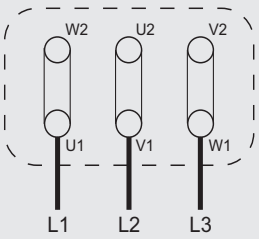
In case of a three-phase motor

The motor connection depends on the voltage indication on the type plate and the applied supply voltage.

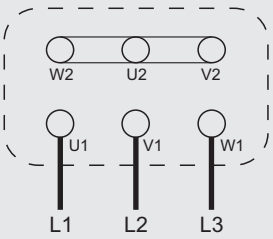
Example:

Indication on the type plate:	Δ 230V/ Y400V 50Hz
Three-phase power system on sit:	Y400V 50 Hz
Correct motor connection:	Star connection (Y)

Δ Delta connection



Y Star connection



Direction of rotation

The direction of rotation of the drive motor is arbitrary.

Terminal box

Before closing the terminal box, please check that:

- All terminal connections are tightly fitted.
- The interior is clean and free of foreign bodies.
- Unused cable entries are closed and screw plugs are tightened.
- The sealing is correctly inserted in the cover of the terminal box; check proper condition of all sealing surfaces so that the demands of the protection category are fulfilled.

Motor protection

Provide for adequate motor protective equipment in order to protect the motor from overload (e.g. motor protection switch with thermal overcurrent release).
Connect the ground wire to the marked earth screw in accordance with VDE 0100.

ATTENTION

Fuses do not protect the motor!

TECHNICAL DATA

PUMP DATA			ZX..411.3-2200e		ZX..411.3-2600e		ZX..411.3-3100e	
			XM/RF	ZXRI	ZXM/RF	ZXRI	ZXM/RF	ZXRI
Permissible pressure $p_{2max.}$ at the pump outlet	bar		4					
Nominal capacity QN at $p_{2max.}$	l/h	50 Hz	2.200	230-2.200	2.600	230-2.600	3.100	230-3.100
		60 Hz	2.640	230-2.200	3.120	230-2.600	---	230-3.100
Max. suction height	mWC		8					
Min./max. permissible pressure at the pump inlet	$p_{1min/max}$ bar		-0,8/0					
Recommended nominal diameter DN of the connecting pipes	mm	Inlet	32					
		Outlet	25					
Nominal stroke frequency	1/min	50 Hz	94	94	105	105	131	131
		60 Hz	113	94	126	105	---	131
Weight approx.	kg	plastic	75	75	75	80	80	80
		stainless steel	95	100	100	107	106	109

Linear dosing range at a stroke length between 20% and 100%.
The nominal data refer to water, 20°C and nominal pressure. With lower counterpressure it can come to be soaked off achievements.

ELECTRICAL DATA		ZXM 411.3-... e	ZXRF 411.3-... e	ZXRI 411.3-... e
Power consumption	kW	0,75	1,1	0,75
Voltage	V	230/400V 50Hz, 460V 60Hz		
Frequency	Hz	50/60		
Protection category	IP	65	65	54

NOTE

The motor data can be read off the type plate on the drive motor of the respective pump!

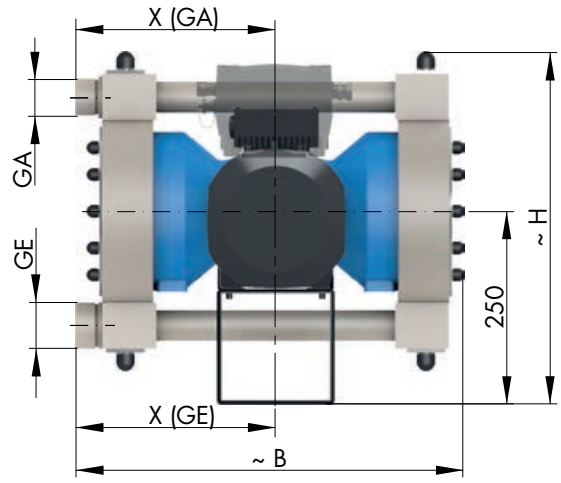
NOISE MEASUREMENT	
Max. sound pressure at max. burden	50 - 65 dB(A)

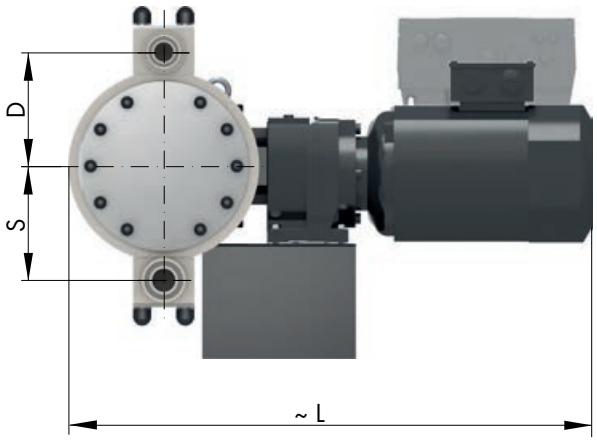
VISCOSITY, PUMPED MEDIUM	
Max. viscosity with non-spring-loaded valves	100 mPas (=cP)

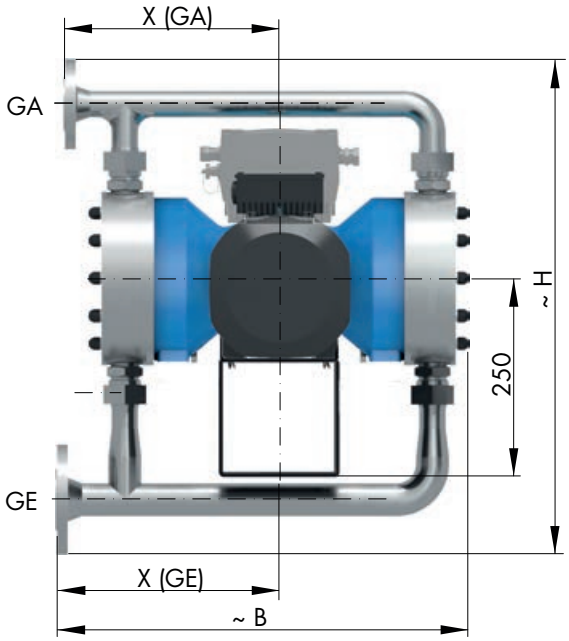
TEMPERATURE DATA	
Max. liquid temperature	60 °C
Min. liquid temperature	10 °C
Max. operating temperature	40 °C
Min. operating temperature	0 °C
Max. storage temperature	40 °C
Min. storage temperature	0 °C

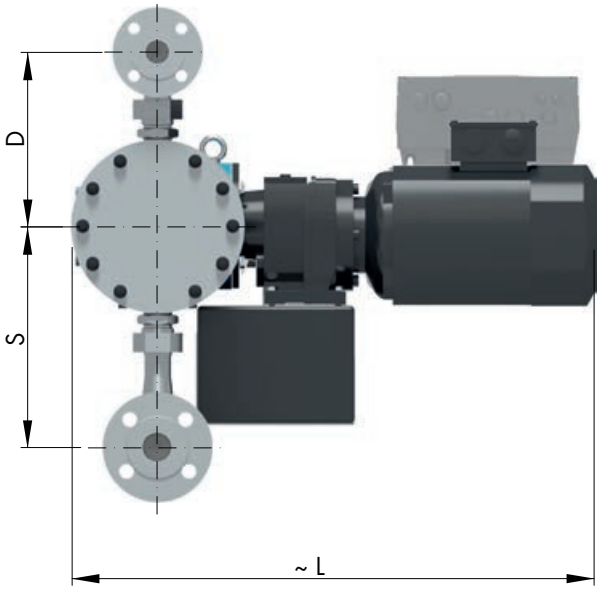
AMBIENT CONDITIONS	
Max. installation altitude above sea level	1000 m
Max. relative air humidity	< 90%

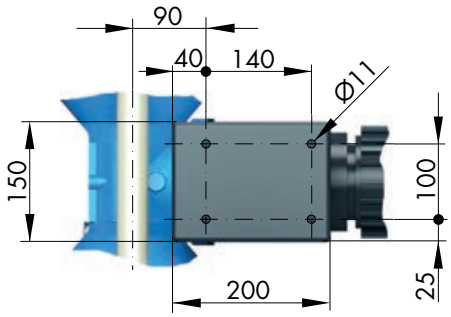
Dimensions


X (GA)
GA
GE
~ H
250
X (GE)
~ B


D
S
~ L


X (GA)
GA
GE
~ H
250
X (GE)
~ B


D
S
~ L


90
40
140
Φ11
150
100
200
25

SUCTION VALVES		ZX..411.3-2200e	ZX..411.3-2600e	ZX..411.3-3100e
DN	Nominal width	32	32	32
GE	PP-FRP/ PVDF-FRP/ PVC-U	G2	G2	G2
GE	1.4571		DN32 PN16 DIN2633	
S	PP-FRP/ PVDF-FRP	148	148	148
S	PVC-U	222	222	222
S	1.4571	281	281	281
PRESSURE VALVES				
DN	Nominal width	25	25	25
GA	PP-FRP/ PVDF-FRP/ PVC-U	G1 1/2	G1 1/2	G1 1/2
GA	1.4571		DN25 PN16 DIN2633	
D	PP-FRP/ PVDF-FRP	148	148	148
D	PVC-U	232	232	232
D	1.4571	221	221	221
MAX. TOTAL HEIGHT				
H	PP-FRP/ PVDF-FRP	460	460	460
H	PVC-U	510	510	510
H	1.4571	530	530	530
MAX. TOTAL WIDTH				
B	PP-FRP/ PVDF-FRP	505	505	505
B	PVC-U	530	530	530
B	1.4571	525	525	525
MAX. TOTAL LENGTH (standard)				
L	PP-FRP/ PVDF-FRP	680	680	680
L	PVC-U	665	665	665
L	1.4571	665	665	665
CONNECTION DIMENSIONS (GE) SUCTION SITE				
X	PP-FRP/ PVDF-FRP	260	260	260
X	PVC-U	281	281	281
X	1.4571	283	283	283
CONNECTION DIMENSIONS (GA) PRESSURE SITE				
X	PP-FRP/ PVDF-FRP	260	260	260
X	PVC-U	270	270	270
X	1.4571	271	271	271

(Measurements in mm)

ASSEMBLY / INSTALLATION

WARNING

Observe and follow the safety instructions by all means.
See the additional instructions „SAFETY INSTRUCTIONS“.
Man, machine and environment are endangered if the safety instructions are not observed.

NOTE

Pump design data for dosing and its temperature can be found in the order confirmation.

NOTE

Operating conditions:
Ambient temperature, relative air humidity and max. installation altitude ► see chapter „Technical data“.

- The standard model of the pump is only approved for installation in dry areas in a non-aggressive atmosphere.
- Protect the pump from heat sources, direct sunlight and UV light.
- See “Dimensions” chapter for dimensions of the pump connections and fixing holes.
- Fixing the pump with at least four bolts above the pump base is required for safe operation.
- Install the pump so that there is no vibration and no tension and that it is aligned precisely.
- Install the pump at the optimum possible operating height. Mount the pump so that the valves are vertical.
- Ensure that there is sufficient space around the pump body and the suction and pressure valve so that these parts can be easily dismantled if required.
- Design the nominal diameters of the downstream piping and the valves installed in the system to be the same size or larger than the nominal inlet and outlet diameters of the pump.
- To check the pressure ratios in the piping system, it is recommended to provide connections for pressure measurement fittings (e.g. manometers) near the suction and pressure ports.
- Drain valves must be provided.
- Before connecting the pipes, remove the plastic caps on the suction and pressure ports of the pump.
- Check the fastening bolts for the pump body for tightness and tighten if necessary, see chapter “Overview of the tightening torques”.
- Connect pipes to the pump so that there are no forces acting on the pump, such as e.g. misalignment, weight or strain of the pipe.
- Keep the suction pipes as short as possible.
- Use pressure and medium resistant hoses / pipes.
- All pipes and containers connected to the pump must comply with the regulations and must be cleaned, tension-free and intact.
- Display devices must be easily accessible and readable.

In order to avoid cavitation, overload or excessive delivery, the following points should be noted:

- Avoid high suction heights.
- Keep pipes as short as possible.
- Select sufficiently large nominal diameters.
- Avoid unnecessary choke points.
- Install a pulsation damper.
- Install overpressure protection.
- Install a pressure-sustaining valve, if necessary
- Provide feed line for outgassing media.

WARNING

The pump with a control is only designed for operation outside Ex-zonest!

SUCTION SIDE (1)

The following fittings can be used on the suction side:

1.1 Line strainer

1.2 Suction aid
Siphon vessel

1.3 Suction lance

1.4 Multifunction device

1.5 Foot valve

1.6 Shut-off valve

PRESSURE SIDE (2)

The following fittings can be used on the pressure side:

2.1 Vent valve

2.2 Injection fitting

2.3 Dosing valve

2.4 Pulsation damper

2.5 Diaphragm pressure keeping valve

2.6 Diaphragm relief valve

2.7 Multifunction valve

2.8 Flow meter [1]

2.9 Flow monitor [1]

2.10 Shut-off valve

[1] only for diaphragm pumps with a control

SUCTION SIDE (1)

Line strainer (1.1)

Connect suction line slightly above the bottom of the tank and install a line strainer (0.1 – 0.5 mm mesh size – depending on valve nominal diameter of the pump).

ATTENTION

If impurities are not removed, this results in malfunctions of the pump and the system.

Suction aid / siphon vessel (1.2)

For high tanks without connection on the bottom of the tank ► install suction aid / siphon vessel.
Thereby, pay attention to accelerating pressures which may be generated in a long suction pipe.

Suction lance (1.3)

Install a suction lance for removal of chemicals from tanks and barrels.
The integrated foot valve prevents the backflow of the suctioned medium.
The suction lances are equipped with a level switch for „empty“ signal.

Multifunction device (1.4)

The multifunction device is installed in the suction side piping of the pump and is used for determination of the delivery rate of pumps under real operating conditions.
The device can be filled either using a pending tank volume (communicating container) or using a hand vacuum pump.

Foot valve (1.5)

To prevent running dry of the suction line ► install foot valve (check valve) at the end of the suction line.

PRESSURE SIDE (2)

Vent valve (2.1)

If air can be drawn in due to falling liquid level in the suction tank and at the same time delivered to a pressurised line or against a pressure-sustaining valve ► install vent valve in the pressure line.

NOTE

The delivery flow can be interrupted if there is air in the suction line!

Injection fitting (2.2)

Install an injection fitting that routes into a main line to prevent the backflow of the pumped medium in the dosing line.

WARNING

Unwanted mixing in the dosing line occurs if any possible backflow from the main line is not prevented.

Dosing valve (2.3)

Installation of the dosing valve prevents the liquid from the system to be treated being able to penetrate into the dosing line.

Pulsation damper (2.4)

Damping of the pulsation by installation of pulsation dampers if:

- a low-pulsation delivery flow is desired for process reasons,
- acceleration forces caused by the piping geometry must be removed.

Install pulsation damper as close as possible to the pump head.
If both pulsation damper and pressure-sustaining valve should be integrated, install the pressure-sustaining valve between pump and pulsation damper.

WARNING

Undamped acceleration forces can result in the following faults / damage:

- flow rate fluctuations
- dosing errors
- pressure surges
- valve shocks
- increased wear on the suction and pressure sides of the pump
- mechanical destruction of the pump
- leaks and valve shocks if the permissible maximum pressure on the pump pressure
- side is exceeded
- damage to the piping and its installed fittings

Diaphragm pressure-keeping valve (2.5)

If dosing into a main line with negative pressure ► install pressure-keeping valve in the dosing line.

ATTENTION

It must be ensured during the installation that excess delivery (due to positive pressure difference (≥ > 1 bar) between pressure and suction sides) is avoided.

Diaphragm relief valve (2.6)

If the permissible pressure in the system can be exceeded by closing any shut-off valve or by clogging of the line ► install diaphragm relief valve.

When using an external overflow valve, the following is applicable for the return line:

- Route the return line sloping downward into the storage tank which is under atmospheric pressure or into an open drainage channel.
- Or connect directly to the pump suction line, but only if there is no check valve in the suction line (e.g. foot valve of a suction lance).

ATTENTION

Shut-off valves must not be closed when the pump is running!

WARNING

An overpressure protection device (e.g. relief valve) must generally be provided if the permissible operating pressure can be exceeded.

ATTENTION

If the permissible operating pressure is exceeded and the pump is not equipped with overpressure protection, the pump will be damaged.

WARNING

The pumped medium can spray out if the pump is damaged.

Multifunction valve (2.7)

The multifunction valve provides the following functions:

- pressure-keeping valve function,
- overflow valve function,
- pressure relief function,
- venting.

The multifunction valve is mounted directly on the pump pressure port.

Flow meter (2.8)

For measurement and monitoring of the flow rate ► install flow meter.
The application range is restricted to media that are similar to water.
The flow meter is screwed upright on the pressure port of the pump and connected to the pump electronics via the input for flow monitoring.

Flow monitor (2.9)

To record the flow rate of the pump ► install flow monitor.
The application range is restricted to media that are similar to water.
The flow monitor is screwed upright on the suction port of the pump and connected to the pump electronics via the input for flow monitoring.

Operation in Ex-zone

WARNING

The prerequisite for the use in explosion-hazardous areas is an appropriate design of the pump.

The product supplied by **sera** meets the requirements of directive 2014/34/EU if it is correspondingly marked. This guarantees safe operation in explosion-hazardous areas.

WARNING

It is the operator's task to define the field of application and to check whether the pump is suited for this application. He/she must clearly define the zone, the device category, the explosion group and the temperature class.

WARNING

Avoid build up electrostatic conditions!

WARNING

To avoid contamination of the valves strainers in the suction line have to be installed!

Identification

The pump has a label stating the zone/device category /explosion group/temperature class in compliance with directive 2014/34/EU.

II2G Ex h IIB T4 resp.

II2G Ex h IIC T4
(note special specifications in the confirmation of order.)

Installation

The intended operating conditions in explosion-hazardous areas according to directive 2014/34/EU are stated in the confirmation of order or the product description. The indicated limit values should not be fallen below or exceeded. Installation regulations given in the operating instructions must be adhered to.

WARNING

Use only suitable tools for performing assembly and maintenance work on machines or plants in explosion-hazardous areas. Directive 99/92/EC must be observed.

Potential equalization

After mounting the pump the proper connection to the site potential equalization is to be ensured. The max. bleed resistor (1MΩ) has to be checked and documented.

Start-up

After installation, the pump must immediately be used for the suction of fluids, i.e. the pump must immediately be started after the tank has been installed and filled.

Operation

The intended operating conditions in explosion-hazardous areas according to directive 2014/34/EU are stated in the confirmation of order or the product description. The indicated limit values should not be fallen below or exceeded. Details about explosion zone, device category, explosion group and temperature class can be seen from the Declaration of Conformity.

Degassing of the pumped medium:

- Never let the pump run dry.
- Check the liquid level in the tank during operation of the pump.
- Make sure that the pump is switched off when the liquid level in the tank falls below the minimum level required (explosive atmosphere may be carried over)..

Vapour bubbles from the pumped medium are harmless as they have no explosive potential.

WARNING

Formation of an explosive gas mixture must be prevented.

Temperature indications

Permissible ambient temperature: -10°C ≤ Ta ≤ +40°C

Maintenance

The maintenance notes listed in Chapter 10 are generally applicable. **Exception:**

ATTENTION

The oil level in the stroke mechanism of the pump must be checked once a week!

WARNING

Observe and follow the safety instructions by all means.
See the additional instructions „SAFETY INSTRUCTIONS“.
Man, machine and environment are endangered if the safety instructions are not observed.

Adequate fastening at the pump foot and compliance with the operating parameters specified in the technical data are required for the operation of the pump.

Checks before every start-up:

- Check all connections for tightness.
- Tighten fixing bolts of the pump body with the specified tightening torques (see „Overview of the tightening torques“ chapter).
- Check of the electrical connections.
- Check of the mains voltage on the rating plate with the local conditions.

Driving motor

Preconditions:

- Make sure that voltage and frequency correspond with the indications on the type plate of the motor. Permissible voltage tolerance (DIN VDE 0530).
- For rated voltage ► + 10 %
- For rated voltage range ► ± 5 %
- The connecting cable must be dimensioned according to the motor characteristics.
- Secure connecting cable with a strain relief.
- The nominal motor power refers to an ambient temperature and an installation site ► see chapter „TECHNICAL DATA“ . Motor output will be reduced if these values are exceeded (see VDE 0530).
- Adapted for “moderate” groupe of climates according to IEC 721-2-1.

WARNING

Observe and follow the safety instructions by all means.
See the additional instructions „SAFETY INSTRUCTIONS".
Man, machine and environment are endangered if the safety instructions are not observed.

Check the following at regular intervals:

- Tight fit of piping.
- Tight fit of pressure and suction valve.
- Proper condition of the electrical connections.
- Tight fit of the screws for fastening the pump body (check this at least every three months).
- For the tightening torques of the mounting screws, please see Chapter „Overview of the tightening torques".
- Additionally with motor pumps: Check oil level regularly (oil eye).

Drive motor

The electric motor should always be kept clean so that neither dust, dirt, oil nor other contaminates may affect the correct operation.

In addition, we recommend to ensure that:

- The motor does not produce strong vibrations
- Suction and blowing openings for the supply of cooling air are not closed or restricted (may lead to unnecessary high temperatures in the windings)

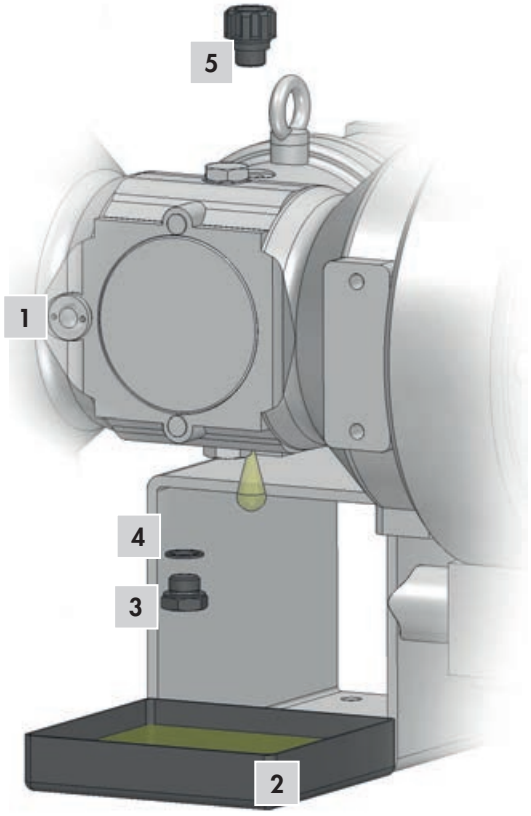
The ball bearings inserted in the motor are lubricated for life.

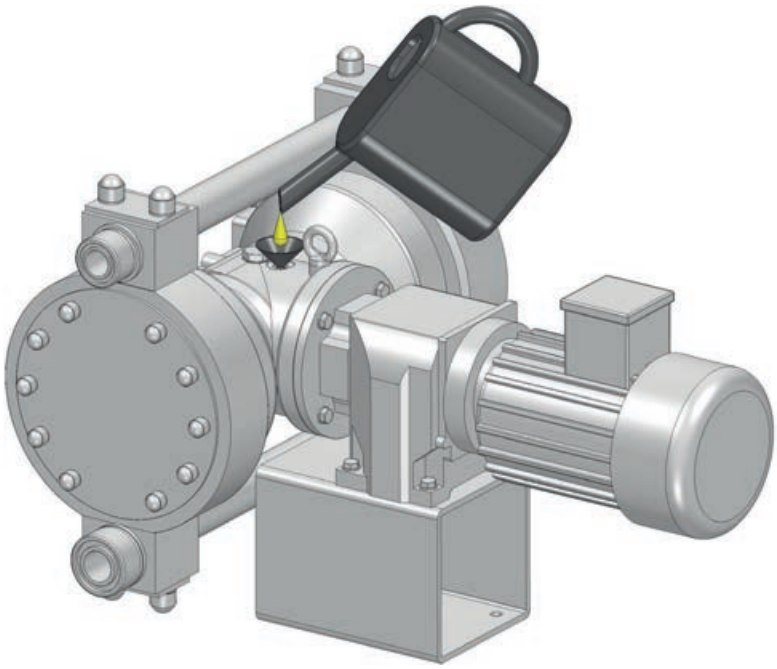
Oil change

Check oil level at regular intervals (oil sight glass (**1**))

Perform an oil change once a year.
To do so, proceed as follows:

- Unscrew the venting screw (**5**).
- Prepare an appropriate container (**2**).
- Open the screw plug (**3**) and drain off oil.
- Close hole with screw plug (pay attention to the sealing ring (**4**)!).
- Fill oil in threaded hole of the venting screw.
- Screw in venting screw (**5**).





	Gear oil		
Pump type	Specification	sera use	Quantity (litres)
...411.3	CLP VG220 DIN51517-3	Castrol Alpha EP 220	0,8

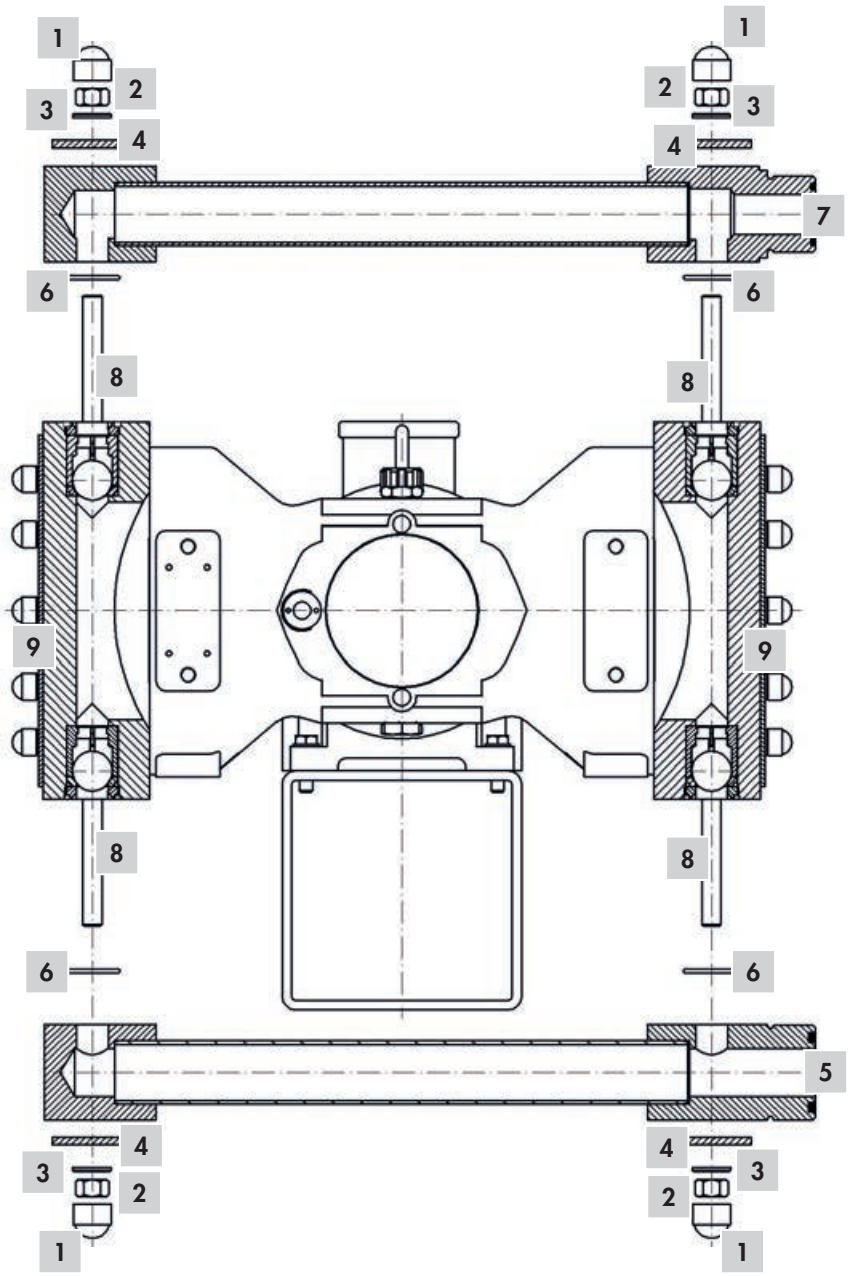
Overview of the tightening torques

	Pump body PP, PVDF	Pump body PVC-U	Pump body 1.4571
		Nm	
...411.3	15	15	15

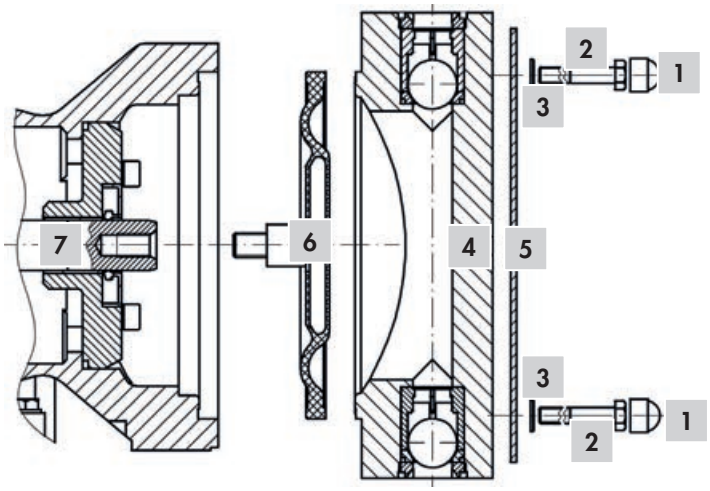
Changing the Diaphragm

In order to ensure a correct function of the diaphragm pump and to fulfil the required safety and protective provisions it is absolutely necessary to check and replace the diaphragms at regular intervals.

- Disassembly of suction joint:
  - Remove protective caps (**1**) and hexagon nut (**2**) with washers (**3**).
  - Take off front plates (**4**).
  - Remove suction joint (**5**). Take care that no suction joint parts fall off the pump body.
  - Remove o-rings (**6**).
- Disassembly of pressure joint:
  - Remove protective caps (**1**), hexagon nut (**2**) and washers (**3**).
  - Take off front plates (**4**).
  - Remove pressure joint (**7**).
  - Remove o-rings (**6**).
- Pull stud bolts (**8**) from pump (**9**) body and remove.



- Remove protective caps (**1**).
- Loosen hexagon screws (**2**) at the pump body and remove along with washers (**3**).
- Remove pump body (**4**) and front plate (**5**) (if installed) to the front. Take care that no suction joint parts fall off the pump body.
- The working diaphragm to be removed must be brought into a front position by turning the fan blade slowly.
- Screw the drive diaphragm (**6**) out of the connecting rod (**7**).

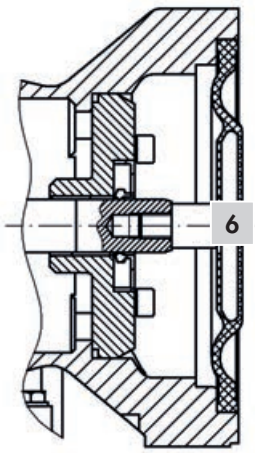


Assemble the pump in reversed order:

Screw working diaphragms onto connecting rod.

- Move the drive diaphragms (**6**) to the middle position by turning the fan blade of the drive motor.
- When assembling the pump body, please note: suction valve below, pressure valve above!
- Observe the tightening torques.
- Mount suction and pressure joint. Use new o-rings.

Add the suction and pressure line and connect pump to the power supply. The diaphragm pump is then again ready for operation.



Spare and wearing parts

The following parts are considered as wearing parts of the pump:

- Drive diaphragm (diaphragm kit)
- Diaphragm rupture electrode
- Valve kit (including O-ring kit)
- O-ring kit

Depending on their use and period of use, wearing parts must be replaced at regular intervals in order to ensure a safe function of the diaphragm pump.

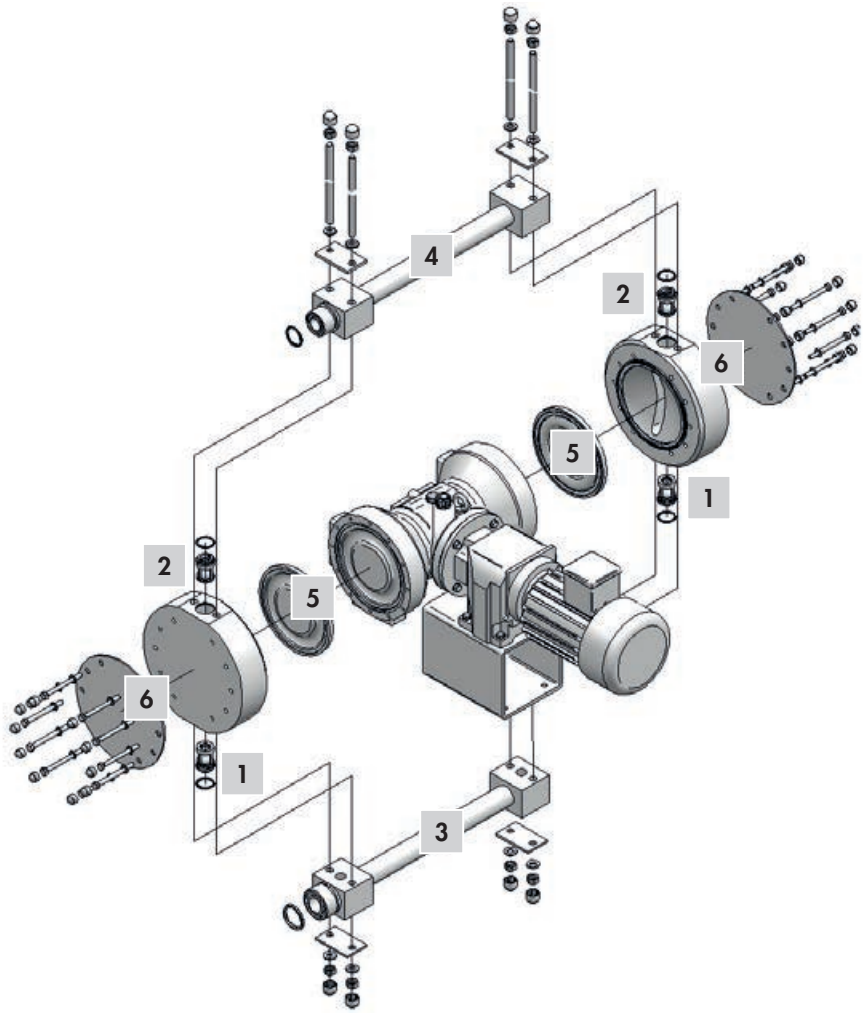
We recommend to replace the wearing parts after 3000 operating hours or at least once a year.

In case of a premature diaphragm rupture caused by hard operating conditions, switch off the diaphragm pump and replace the diaphragms (see chapter „Changing the diaphragm“).

The following parts are considered as spare parts of the pump:

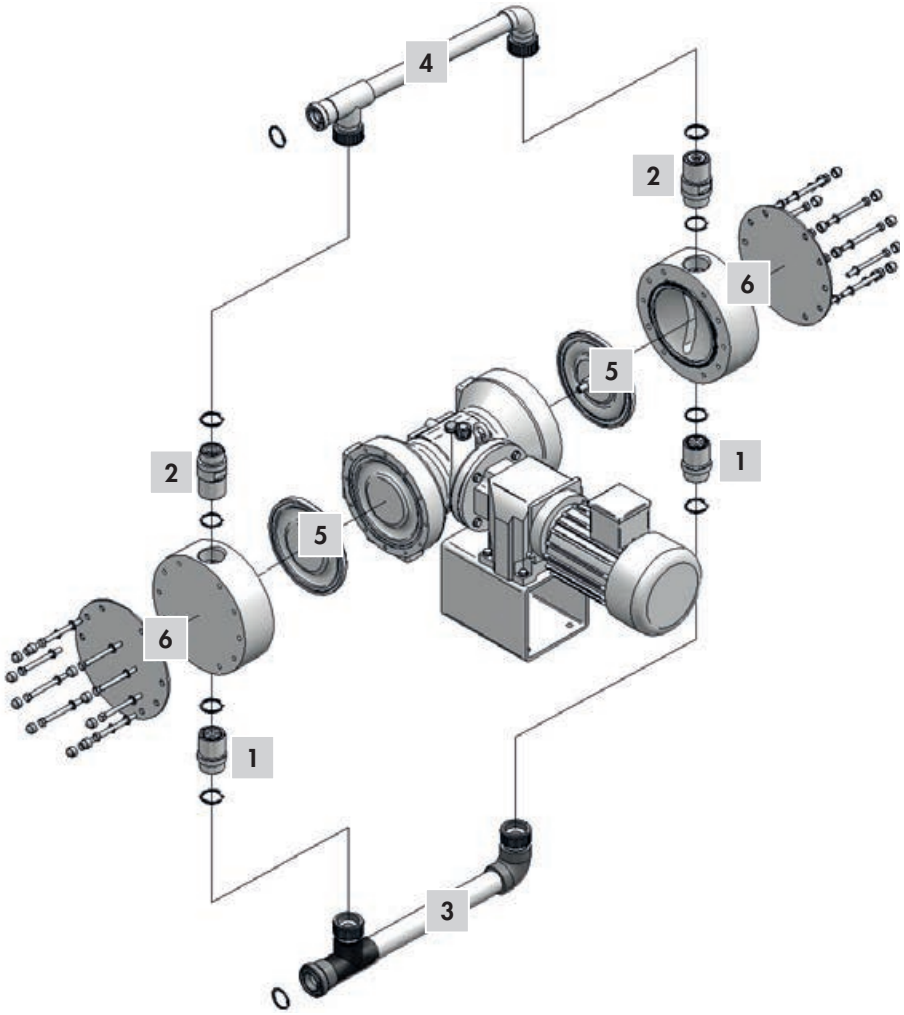
- Pump body kit (including mounting kit)
- Mounting kit

Overview of the spare and wearing part kits PP-FRP/PP, PVDF-FRP/PVDF



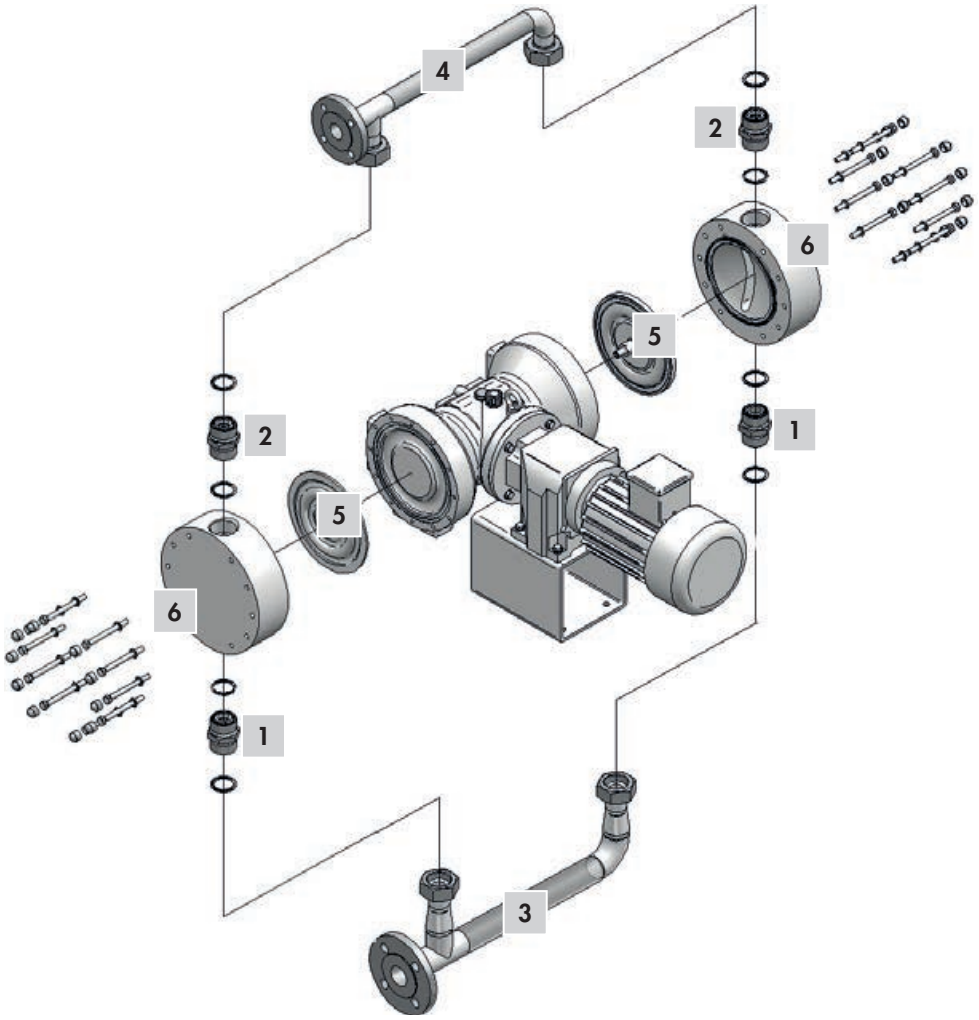
Pos.	Kit	consisting of
1	Suction valve	Suction valve O-ring kit
2	Pressure valve	Pressure valve O-ring kit
3	Suction side piping	Protecting caps Nuts Disks Front plates O-ring Suction joint
4	Pressure side piping	Protecting caps Nuts Disks Front plates O-ring Pressure joint
5	Diaphragm kit	Drive diaphragm
6	Pump body kit	Screws, complete Front plate Pump body
without picture	Diaphragm rupture electrode	Diaphragm rupture electrode

Overview of the spare and wearing part kits PVC-U



Pos.	Kit	consisting of
1	Suction valve	Suction valve O-ring kit
2	Pressure valve	Pressure valve O-ring kit
3	Suction side piping	Piping O-ring
4	Pressure side piping	Piping O-ring
5	Diaphragm kit	Drive diaphragm
6	Pump body kit	Screws, complete Front plate Pump body
without picture	Diaphragm rupture electrode	Diaphragm rupture electrode

Overview of the spare and wearing part kits 1.4571



Pos.	Kit	consisting of
1	Suction valve	Suction valve O-ring kit
2	Pressure valve	Pressure valve O-ring kit
3	Suction side piping	Piping with fixed flange DN32
4	Pressure side piping	Piping with fixed flange DN25
5	Diaphragm kit	Drive diaphragm
6	Pump body kit	Screws, complete Pump body
without picture	Diaphragm rupture electrode	Diaphragm rupture electrode

FAULT ANALYSIS / CORRECTIVE ACTION

sera products are sophisticated technical products which are only shipped after having been thoroughly tested and checked at our factory.
Should there be any faults, these can be detected and rectified easily and quickly based the instructions in the tables.

> **NOTE**
>
> Analysis of the error messages in the display for the pumps with a control ► see the operation instructions of the control!

Fault type															Possible cause	Corrective action
Corrective action!	Display, LED not lit! ▲ Pump with control	Motor does not start! ▲ diaphragm pump	Damage to stroke mechanism / drive!	Pump does not draw in!	Pump does not deliver!	Flow rate is not reached!	Delivery head is not reached!	Flow rate fluctuates!	Maximum permissible flow rate exceeded!	Pipe oscillates heavily!	Too high noise development!	Service life of the drive diaphragm too low!	Drive is overloaded (periodically occurring noises)!	Leakage on pump head!		
				■	■	■									Suction height too high.	Reduce suction height or suction resistance.
				■	■	■		■							Suction pipe leaking.	Check seals, tighten pipe connections.
				■	■							■	■	■	Shut-off valves in piping closed.	Open shut-off valves or check opening state ► check pump for possible damage.
				■	■	■									No pumped medium in storage tank.	Fill storage tank.
				■	■	■	■	■							Pump valves leaking.	Remove and clean valves.
				■	■		■	■							Pump valves (ball seats) damaged.	Remove and clean valves, check function; replace valves if necessary.
				■	■										Pump valves incorrectly mounted or valve balls missing.	Check installation position and completeness ► replace missing parts or install correctly.
				■	■	■		■							Filter in suction line clogged.	Clean filter.
				■	■	■	■	■					■		Electrical data of the pump do not match mains data.	Check order data. Check electrical installation. Adjust motor to the network on site (for diaphragm pumps).
					■	■	■	■		■		■	■	■	Backpressure too high.	Measure pressure with manometer directly above pressure valve if possible and compare with permissible backpressure.
				■	■	■	■	■							Foreign matter in the pump valves.	Remove and clean valves.
								■	■						Pressure on suction side higher than at the end of the pressure pipe.	Check geodetic conditions, install float valve or pressure keeping valve if necessary.
						■	■	■		■	■	■	■	■	Acceleration height too high due to pipe geometry.	Check acceleration height on suction and pressure sides with manometer and compare with design data ► install a pulsation damper if necessary.
												■		■	Materials coming into contact with the medium not suitable for the pumped medium.	Check whether the pumped medium matches the design data and select other materials if necessary.

Fault type															Possible cause	Corrective action
Corrective action!	Display, LED not lit! ▲ Pump with control	Motor does not start! ▲ diaphragm pump	Damage to stroke mechanism / drive!	Pump does not draw in!	Pump does not deliver!	Flow rate is not reached!	Delivery head is not reached!	Flow rate fluctuates!	Maximum permissible flow rate exceeded!	Pipe oscillates heavily!	Too high noise development!	Service life of the drive diaphragm too low!	Drive is overloaded (periodically occurring noises)!	Leakage on pump head!		
				■		■	■	■							Viscosity of the pumped medium too high.	Check viscosity of the pumped medium and compare with design data ► reduce concentration or increase temperature if necessary.
					■	■		■							Pumped medium is outgassing in the suction pipe and/or the pump body.	Check geodetic conditions and compare with data of the pumped medium. Operate pump with suction side supply, reduce temperature of the pumped medium.
				■											Air in suction line while pressure is present on the pressure side.	Vent pressure side.
	■														Power supply failed / switched off.	Restore power supply.
				■	■	■	■	■							Pipe connections leaking.	Tighten connections according to type of material. Be careful with plastic ► risk of fracture!!
				■	■										Pumped medium frozen in pipe.	PRemove pump and check for possible damage - increase temperature of the pumped medium.
■	■				■										No mains power connection.	Connect mains power supply.
				■											Pump valves dry.	Moisten pump body and valves. Open vent valve.
				■	■	■								■	Temperature too low.	Check flowability of the dosing medium. Temperature of the medium see „Technical data“.
				■	■	■	■	■				■		■	Diaphragm rupture.	Replace the diaphragm according to the descriptions in Chapter „Replacing the diaphragm“.
■															Reversible thermal fuse of the pump has tripped.	Let temperature of the pump cool down. Check ambient temperature.
	■														Fuse in electronics blown. ► Pump with control	Return pump for repair.
				■	■	■	■								Compensating valve not adjusted to operating conditions. ► diaphragm pump KM	Set compensating valve according to operating conditions. ► diaphragm pump KM

WARNING

Observe and follow the safety instructions by all means.
See the additional instructions „SAFETY INSTRUCTIONS".
Man, machine and environment are endangered if the safety instructions are not observed.

Shut-down

- Switch off piston diaphragm pump.
- Rinse pump head and remove pumped medium; make sure that the rinsing agent is suitable for pumped medium and pump head.

Disposal

- Shut-down system. Please see "Shut-down".

Dismantling and transport

- Shut-down system. Please see "Shut-down".
- Remove all fluid residues from pump body, clean thoroughly, neutralize and decontaminate.
- Package unit and ship.

NOTE

A clearance certificate must be filled in when systems are returned to the manufacturer.
Acceptance will be rejected if this clearance certificate is not attached.

Complete disposal

- Remove all fluid residues from unit.
- Drain off lubricants and dispose of according to regulations!
- Dismount materials and send them to a suitable waste disposal company!

CLEARANCE CERTIFICATE

NOTE

Inspection / repair of machines and machine parts is only carried out after the clearance certificate was filled in correctly and completely by authorized and qualified personnel.

NOTE

Acceptance will be refused if parts are returned to the manufacturer without a proper clearance certificate.

All industrial companies are obligated by the legal provisions for occupational health, e.g. the workplaces ordinances, the Ordinance on Hazardous Substances, the regulations for prevention of accidents and the environmental protection regulations such as the Waste Management Act and the German Household Water Act to protect their employees or man and the environment from detrimental effects when handling hazardous substances.

Should special safety precautions be necessary despite careful draining and cleaning of the product the necessary information are to be provided.

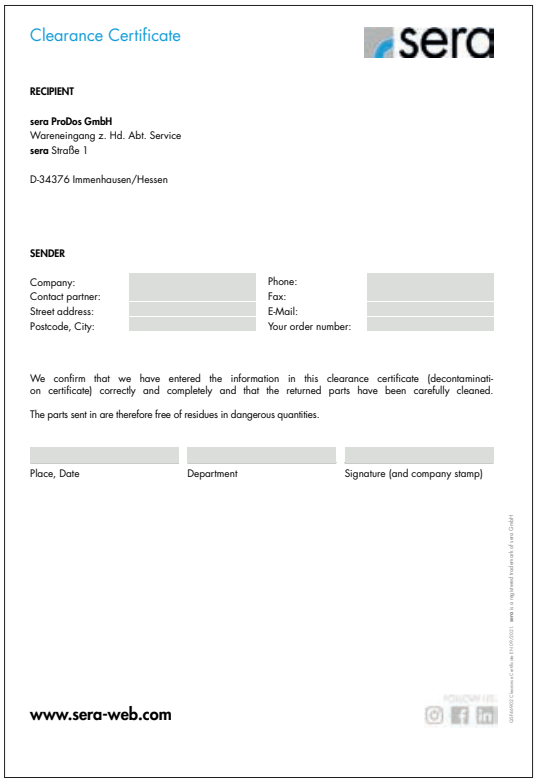
Machines which are operated with radioactive media shall only be inspected and/or repaired in the safety area of the owner by a **sera** specialized fitter.

The clearance certificate is part of the inspection-/repair order.
sera reserves the right to refuse acceptance of the order for other reasons.

DOWNLOAD

Clearance certificate

Or directly scan
the QR code opposite:



Clearance Certificate

sera

RECIPIENT

sera ProDos GmbH
Wareneingang z. Hd. Abt. Service
sera Straße 1

D-34376 Immenhausen/Hessen

SENDER

Company:		Phone:	
Contact partner:		Fax:	
Street address:		E-Mail:	
Postcode, City:		Your order number:	

We confirm that we have entered the information in this clearance certificate (decontamination certificate) correctly and completely and that the returned parts have been carefully cleaned.

The parts sent in are therefore free of residues in dangerous quantities.

Place, Date	Department	Signature (and company stamp)

www.sera-web.com

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