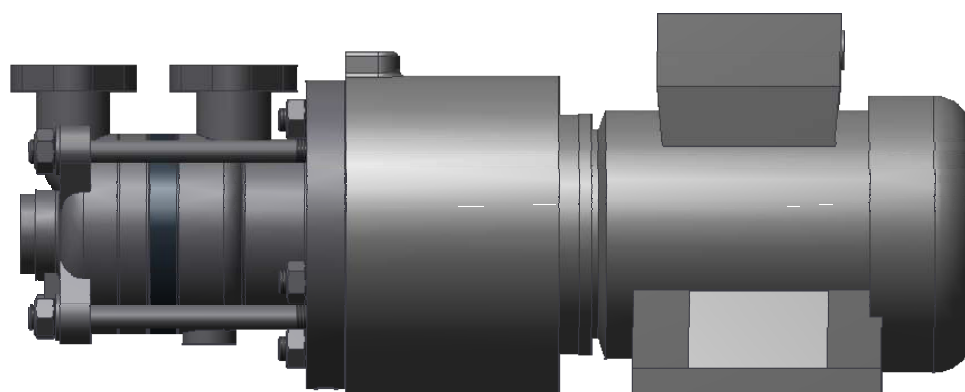


Operation / Installation Instructions

WPM

No. 44.WPM.E3.01/ 18



Original Manual





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1. General

This instruction manual describes the proper and safe usage of the pump during all operating phases.

The instruction manual does not consider local regulations. Adherence to those is the responsibility of the owner.

The name tag states pump type and size, the most important operating data as well as the pump serial number. The serial number is a precise description of the pump unit and serves as identification for all following procedures.

In the event of damage the Customer Service of Dickow Pumpen must immediately be informed in order to maintain guarantee claims.

For installation of supplied interchangeable units, the respective subchapters of "Maintenance, Servicing, Inspection" must be observed.

Applicable documents:

- Pump data sheet
- Dimensional drawing
- Sectional drawing
- Parts lists
- Sub-supplier documentation



2. Safety

The manual includes basic instructions for installation, operation and maintenance. Only if these instructions are strictly observed, a safe handling of pump or pump unit is guaranteed and personal injury and material damage is avoided.

All the safety instructions in this manual must be considered.





This manual must be thoroughly reviewed and completely understood by the qualified personnel / operator before attempting assembly and start-up.

The manual must consistently be available on site.


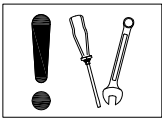

Indications and plates attached to the pump must be followed and kept in legible condition.

2.1 Designation of Warning Notices

Signal word	Explanation
DANGER	signifies an imminent danger. If it will not be avoided, death or severe injury are the consequence.
WARNING	signifies a possibly dangerous situation. If it will not be avoided, death or severe injury may be the consequence.
CAUTION	signifies a possibly dangerous situation. If it will not be avoided, slight or minor injury may be the consequence.
ATTENTION	signifies a possibly harmful situation. If it will not be avoided, danger for the pump and its function may be the consequence.

Symbol	Explanation
	General danger sign Together with a signal word, it signifies dangers in connection with death or injury.
	Dangerous voltage Together with a signal word, it signifies dangers in connection with voltage.
	Warning from magnetic field Together with a signal word, it signifies dangers in connection with magnetic fields.
	Hot surface Together with a signal word, it signifies dangers in connection with hot surfaces.



	Explosion protection Gives information on protection from explosion development in hazardous area according to Directive 2014/34./EU.
	Mechanical breakdown Together with the signal word ATTENTION, it signifies dangers for the pump and its function.
	Notice Provides recommendation and useful information for handling the product.

2.2 Intended use

The pump / pump unit may only be operated in the application area which is described in the relevant pump data sheet. This applies for instance to pumped liquid, flow, speed, pressure, temperature and motor power. Further points to be observed:

- Operate pump in technically faultless condition only.
- Never operate pump if not completely assembled.
- Never operate pump without liquid.
- Observe pump data sheet / operating manual regarding the minimum flow.
- Observe pump data sheet / operating manual regarding the maximum flow.
- Never throttle pump on suction side.
- Maximum speed is 3500 rpm (+10%).

2.3 Avoidance of foreseeable operating errors

- Never open shut-off valves in excess of the allowable range. This would cause exceedance of the maximum flow and possible cavitation damage.
- Never exceed the allowable application limits regarding pressure and temperature which are specified in the pump data sheet.
- Consider and adhere to all safety instructions and other notices mentioned in the operating manual.

2.4 Qualification of personnel

The personnel must possess the relevant qualification for assembly, operation, maintenance and inspection of the pump unit.

Responsibility, competence and supervision must be strictly regulated by the owner.

Skill of the personnel shall be improved by training. Training course can be held by the technical staff of Dickow Pumpen.



2.5 Additional safety regulations

Besides the safety instructions mentioned in this manual, the following additional regulations apply:

- Accident prevention regulations
- Explosion proof regulations
- Safety regulations for handling hazardous materials
- Applicable standards and laws

2.6 Safety instructions for the operator / user

- Protection against contact with hot and cold components must be provided by customer.
- Coupling guard and hand guard on the pump / pump unit must not be removed during operation.
- Pump must always be earth connected / grounded.
- Protective equipment for personnel must be provided and used.
- Toxic liquid leakage must be drained off safely, without endangering individuals and environment. Legal requirements must be observed.
- Danger through electric energy must be excluded.

2.7 Safety instructions for maintenance, inspection and assembly

- Alteration works or modifications on the pump are only allowed after consulting Dickow Pumpen.
- Only original parts or parts approved by Dickow shall be used.
- Repairs on the pump / pump unit may only be done during shutdown.
- The pump casing must have cooled down to ambient temperature.
- The pump must be depressurized and drained.
- Consider the procedure for decommissioning according to chapter 6.6.
- Pumps handling products dangerous to health must be decontaminated according to chapter 4.4
- Coupling guard and hand guard must be mounted again after completion of the works.
- Works on the pump unit may be done only with disconnected electricity.
- Secure the pump unit against unintentional switch-on.

2.8 Non-observance of the instruction manual

Non-observance of this manual leads to loss of warranty and damage claims. Non-observance will involve the following risks:

- Endangering of individuals through electrical, thermal, mechanical and chemical impacts.
- Danger through explosions.
- Danger through breakdown of essential functions.
- Endangering of environment through leakage of toxic liquids.



2.9 Notices on explosion protection

DANGER



Operation in explosive areas requires stringent attention to this chapter.

- Only pumps with relevant identification are allowed to be used in explosive areas.
- Pumps must be designated for this service in the pump data sheet.
- Intended use must be guaranteed.
- Inadmissible operating conditions must be avoided in any case.
- Special conditions apply for operation in compliance with Explosion Proof Directive. The "Ex"- symbol shown here marks the chapters in this manual which require special attention.

2.9.1 Surface temperature

The highest surface temperatures are to be expected at the pump casing and at the containment shell. The surface temperature at the pump casing is equal to the temperature of the pumped liquid.

The surface of the motor lantern must be uncovered. Insulation of the motor lantern is not allowed. Due to minor magnet losses, expected temperature rise in the containment shell area is negligible. Temperature rise is < 5°C based on water.

2.9.2 Monitoring devices

The pump may only be operated within the limits given in the pump data sheet and on the name tag. In case the owner cannot maintain the operating limits, monitoring devices are required. The following risks must be considered:

- **Plugging of internal circulation channels**
The inner liquid filled area of the magnet coupling is cooled by an internal circulation. Interruption of this internal circulation through certain properties of the product (e.g. polymerization) can cause an inadmissible temperature rise.
- **Desynchronisation of the magnet coupling**
Overstressing, overheating or non-observance of the design data may result in desynchronisation of the magnet coupling. The generated heat energy may cause temperature rise of the containment shell.
- **Operation below the minimum flow**
- **Operation above the maximum flow**
- **Dry run**
A temporary dry run can already lead to inadmissible surface temperatures and wear due to the small clearance between side channel impellers and stage disks.

The following monitoring devices can be supplied:

- Level limit switch to avoid dry running.
- Temperature monitoring of the containment shell for controlling elevated temperatures in the containment shell.
- Power monitor for controlling minimum flow and/or maximum flow and detection of dry run and desynchronisation of the magnet coupling.



2.9.3 Application in explosion group II C

In order to avoid brush discharge from machines of group II G, the coating thickness is limited to maximum 0,2 mm.

For thicker coatings, approved conductive coating systems are used.

2.10 Magnet coupling

DANGER



Strong magnetic field from the area of the magnet coupling or from single magnets.

Danger to life for individuals with pace maker!

Disturbance of magnetic data media, electronic devices, components and instruments!

Uncontrolled attractive force between magnetic components, tools etc.!

- A safe distance of 0,3 m minimum must be maintained.

The safe distance refers to inner and outer magnets which are not yet installed in the pump.

In mounted condition, the magnetic field is completely shielded. There is no danger through magnetic fields from an assembled pump. This refers also to pace makers.



3. Description

3.1 General description

This pump is used where ever sealless design and selfpriming ability is required. This applies for instance to dangerous, explosive, toxic and other harmful but clean or gaseous liquids without solids which are handled in the chemical, petrochemical and general industry.

Concerning the selfpriming ability, flange orientation must be considered, e.g. suction and discharge flange face upwards.

3.2 Design code

Example: WPM h 202 A 11 / 1,0 / 18 / 1

	Pump code
WPM	pump type
h	material execution ; e.g. h = 1.4408 / 1.4571
20	pump size
2	number of stages
A	scope of supply; e.g. A = bare shaft pump
	Magnet code
11	material; e.g. 1 = containment shell 1.4571; 1 = rotor 1.4571
1,0	wall thickness containment shell [mm]
18	magnet length [mm]
1	internal circulation

3.3 Pump sizes

Pump size	max. No. of stages	Magnet length [mm]
10	4	18
20	5	18/ 36
23	5	18/ 36



3. Description

3.4 Identification

3.4.1 Name tag

DICKOW Siemensstr. 22 PUMPEN D-84478 WALDKRAIBURG	
Bezeichnung	
Type	
Pos. Nr.	
Fabr.Nr. PB	Baujahr
Q <input type="text"/> m ³ /h	H <input type="text"/> m Laufrad-ø <input type="text"/> mm
n <input type="text"/> min ⁻¹	ρ <input type="text"/> kg/dm ³ P <input type="text"/> kW
MAWP@Temp <input type="text"/> bar	@ <input type="text"/> °C
Prüfdruck	<input type="text"/> bar
Ausführung	
➔ Made in Germany CE	

DICKOW Siemensstr. 22 PUMPEN D-84478 WALDKRAIBURG	
Designation	
Type	
Item No.	
Serial No. PB	Year of constr.
Q <input type="text"/> m ³ /h	H <input type="text"/> m Impeller-ø <input type="text"/> mm
n <input type="text"/> min ⁻¹	ρ <input type="text"/> kg/dm ³ P <input type="text"/> kW
MAWP@Temp <input type="text"/> bar	@ <input type="text"/> °C
Test Pressure	<input type="text"/> bar
Design	
➔ Made in Germany CE	

Fig. 1: Name tag German and English

3.4.2 Identification acc. to Explosion Proof Directive

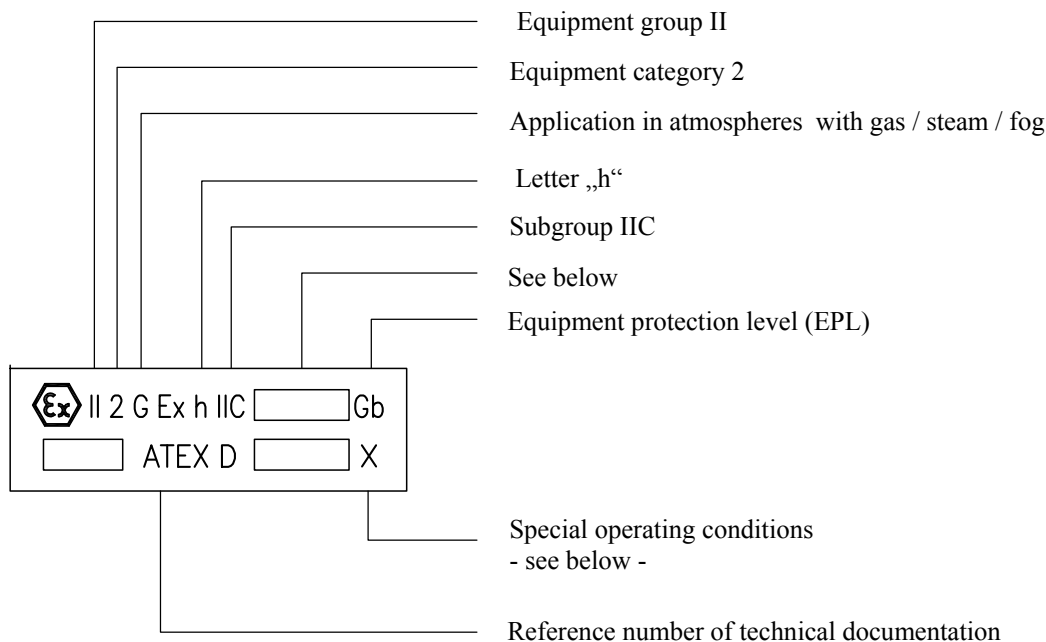


Fig. 2: ATEX- nameplate

The surface temperature does not depend on the ignition source, but on the temperature of the pumped liquid. There is no identification with a temperature class or a temperature. The marking contains an identification of T-area or temperature range as well as the symbol “X” (behind the reference number of technical documentation) for special operating conditions regarding the temperature.

Chapter 2.9.1 refers to the arising surface temperatures.

Space permitting, this Ex-marking is integrated in the name plate as per chapter 3.4.1.



3.5 Design

Design

- side channel pump
- horizontal installation
- multistage
- with radial suction and discharge flange, selfpriming

Pump casing

- flange orientation is possible in each axial direction

Impeller

- star-shaped side channel impellers

Bearing

- pump end: product lubricated sleeve bearings

Shaft sealing

- magnet coupling

3.5.1 Magnet coupling

The drive power is transmitted by the motor - through the magnetic field lines - via the outer magnets to the inner magnet coupling. The inner and outer magnets are tied together through magnetic field lines and are therefore synchronized. No slip exists, the motor speed complies with the coupling speed.

The pump shaft with impeller and driven inner magnet is carried by wetted sleeve bearings. The SiC components have an almost unlimited service life as long as a stable fluid film is available between the sliding surfaces.

The heat in the metallic containment shells, generated through eddy currents, is dissipated through an internal circulation flow. The internal circulation is an additional safety against exceedance of boiling point in the magnet chamber and serves as a lubrication of the sleeve bearings.



3. Description

3.5.2 Flange orientation

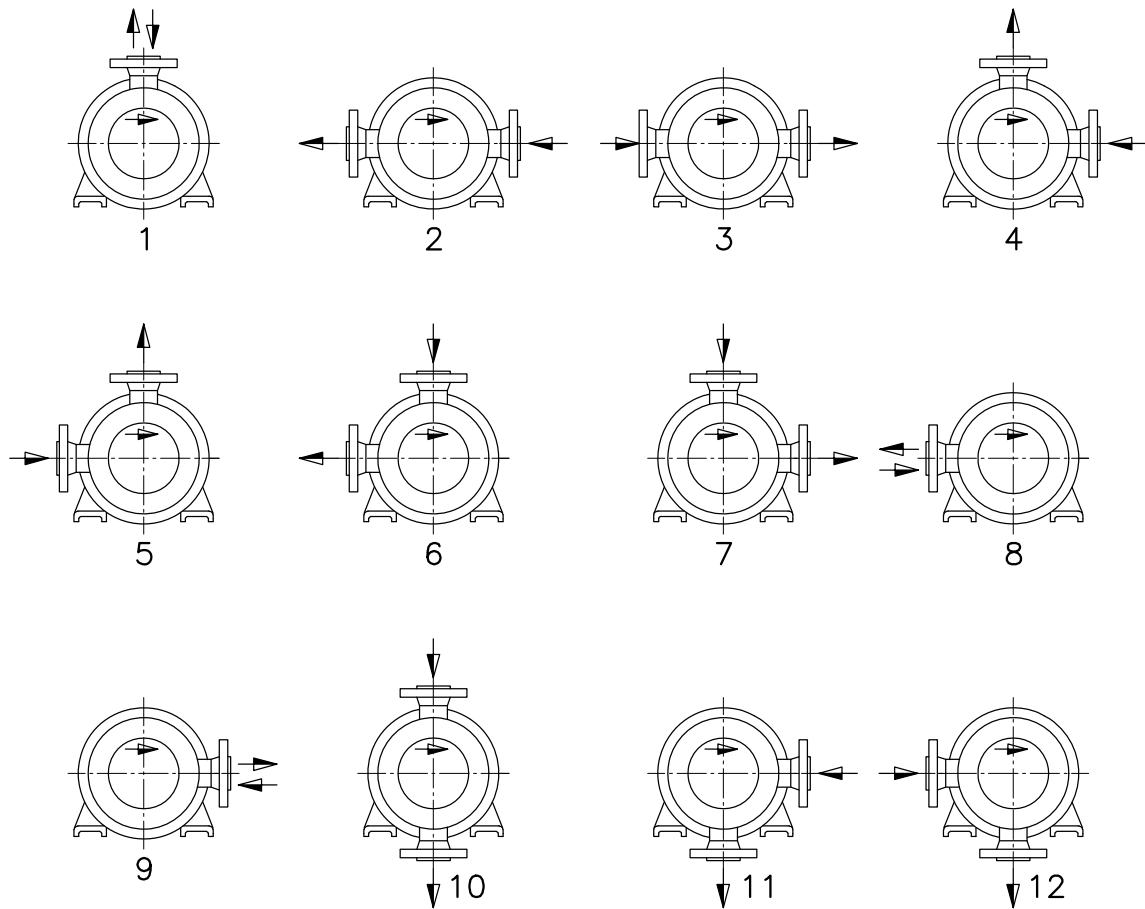


Fig. 3: Flange positions viewed from drive end

NOTE



Flange orientation depends on the number of stages!
Self-priming only with flange orientation 1.

3.6 Scope of supply

Depending on the pump execution, the following items belong to the scope of supply:

- Pump
- Drive motor
- Special accessories if required

3.7 Dimensions and Weights

Dimensions and weights can be taken from the foundation plan / dimensional drawing.



4. Handling / Storage / Disposal

4.1 Handling

DANGER

Slipping of pump / pump unit from its suspension

Danger of life through components falling down!



- Lift the pump / pump unit only in horizontal position.
- Never hang up the pump unit on the ring screw of the motor.
- Do not stay underneath floating loads.
- Consider weight indications in the dimensional drawing.
- Observe the local accident prevention regulations.
- Use suitable and approved lifting accessories.

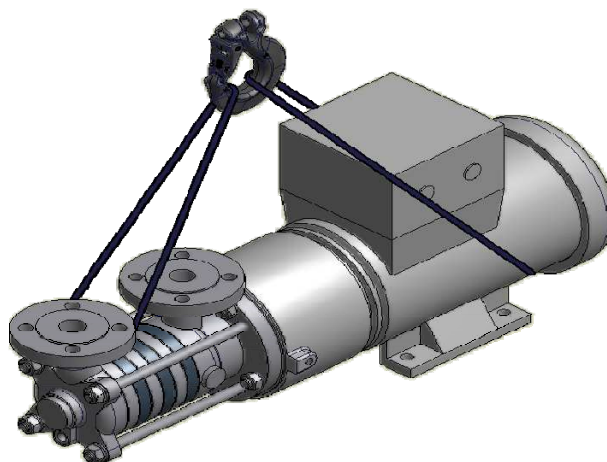
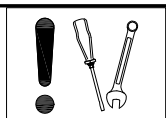


Fig. 4: lifting the pump

4.2 Storage / Preservation

ATTENTION

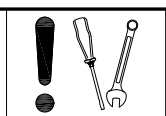


Damage during storage through moisture or dirt.

Corrosion and / or contamination of the pump!

- Outside storage requires a water tight cover over pump or over packed pump and accessories.

ATTENTION



Wetted, contaminated or damaged openings and joints.

Leakage or damage of the pump!

- Plugged openings should be uncovered only during installation.



4. Handling / Storage / Disposal

The following measures are recommended for storage of the pump / pump unit:

- Store the pump in a sheltered dry place with normal air humidity of 60%.

For storing a pump that has been in operation already, consider chapter 6.6.

4.3 Return of pump

- Drain the pump properly considering chapter 7.3.
- Rinse and clean the pump in general, especially when handling dangerous, explosive, hot or other risky liquids.
- A Document of Compliance completely filled in must always be attached to the pump. Refer to chapter 11.2.

NOTE

If required, a Document of Compliance can be downloaded under www.dickow.de.



<http://www.dickow.de/unbedenk.pdf> (German)

<http://www.dickow.de/unbedenk-en.pdf> (English)

4.4 Disposal

WARNING

Liquids dangerous to health



Danger for individuals and environment!

- Collect and dispose rinsing water and residual liquid.
- Wear protective clothing and face mask.
- Consider the legal regulations for disposal of liquids dangerous to health.

1. Disassemble pump / pump unit.
2. Collect grease and oil.
3. Separate pump materials
4. Dispose according to the local regulations.



5. Installation / Mounting

5.1 Safety Instructions

DANGER



Improper installation in explosive area

Danger of explosion!

- Consider the local applicable explosion proof regulations.
- Consider indications on the pump data sheet and on the name tag of pump and motor.

DANGER



Strong magnetic field from the area of the magnet coupling or from single magnets

Danger to life for individuals with pace maker!

Disturbance on magnetic data media, electronic devices, components and instruments!

Uncontrolled attractive force between magnetic components, tools etc. !

- A safe distance of 0,3 m minimum must be maintained.
- Consider additional notes in chapter 2.10.

5.2 Foundation

WARNING



Installation on weak and unstable foundations

Personal injury and material damage!

- Consider sufficient load capability acc.to class C12/15 in the exposure class XC1 as per EN 206-1.
- Place the pump unit on hardened foundation only.
- Place the pump unit on level and even surfaces only.
- Consider weight indications of dimensional drawing.
- Provide vibrationless foundation.

5.3 Installation of pump unit

5.3.1 Installation on substructure

If installation on substructure is foreseen, its firmness and consistency must be proofed.

1. Place the pump unit and align it.
2. Insert shims for height compensation.
3. Tighten the mounting nuts/bolts.



5.4 Piping

DANGER



Exceedance of the allowable loads at the pump flanges

Danger to life from leaking hot, toxic, caustic or flammable liquids.

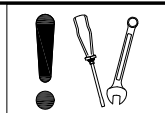
- Do not use the pump as an anchor point for piping.
- Support piping before the pump and connect it stress-free.
- Consider allowable flange forces and moments.
- Compensate expansion of the piping in case of high temperatures.

5.4.1 Suction pipe

Layout of suction pipe requires special attention. NPSH Available and NPSH Required must be clearly defined. Pay attention to the following:

- Mounting of elbows close to the pump suction must be avoided. Provide a straight pipe of minimum two suction pipe diameters
- Never connect a larger suction pipe direct to the pump. Flow eddies reduce the free flow area of the pump. Use an eccentric reducer.
- At suction lift conditions, the suction pipe must continuously slope upwards towards pump suction. Avoid air pockets.
- At flooded suction conditions, the suction pipe must slope gradually downwards to the suction flange. Avoid air pockets to ensure a complete venting.
- Maximum flow speed of 2 m/s must not be exceeded

ATTENTION



Damage of the pump!

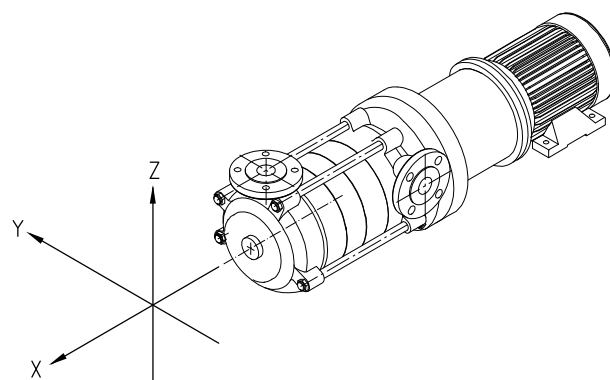
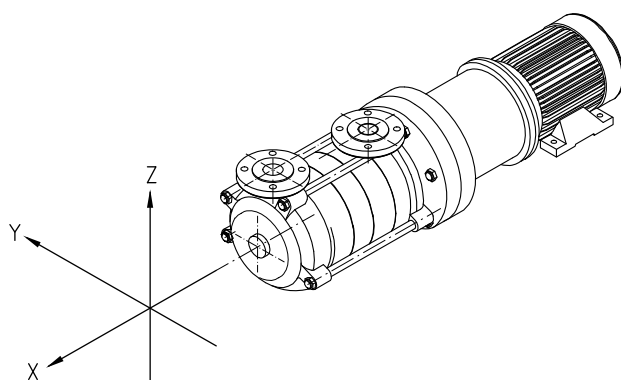
- Piping must be thoroughly cleaned before connecting the pump
- Remove impurities from the pipes.
- If required, insert a filter.

NOTE



- Use a filter with a mesh width of 0,2mm.
- Insert filter with a surface of minimum triple the pipe section.

5.4.2 Allowable flange forces and moments



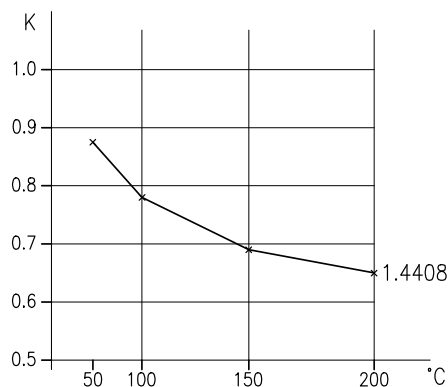


5. Installation / Mounting

Flange	Top flange							
	F _x [N]	F _y [N]	F _z [N]	Σ F [N]	M _x [Nm]	M _y [Nm]	M _z [Nm]	Σ M [Nm]
DN 15 ½ "	75	75	80	90	50	70	80	90
DN 25 1 "	155	150	160	180	90	100	120	160

Flange	Side flange							
	F _x [N]	F _y [N]	F _z [N]	Σ F [N]	M _x [Nm]	M _y [Nm]	M _z [Nm]	Σ M [Nm]
DN 15 ½ "	75	80	75	90	50	70	80	90
DN 25 1 "	155	160	150	180	90	100	120	160

Forces and moments are based on 20°C. Temperature dependent correction values are given in the figure below.



In case that not all acting loads reach the maximum allowable values, one of these loads may exceed the limit value under the following provisions:

- Exceedance is limited to 1,4 times the allowable value.
- For the actual forces and moments acting on the flange shall apply:

$$\left(\frac{\Sigma F /_{actual}}{\Sigma F /_{max. allowable.}} \right)^2 + \left(\frac{\Sigma M /_{actual}}{\Sigma M /_{max. allowable.}} \right)^2 \leq 2$$

5.5 Insulation

WARNING



Wetted casing parts adopt the temperature of the pumped liquid.

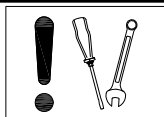
Risk of burns!

- Insulate casing parts
- Attach protective device



5. Installation / Mounting

ATTENTION



Heat accumulation in the motor lantern

Bearing damage!

- Do not insulate the motor lantern

5.6 Electrical connection of the pump unit

DANGER



Improper electrical installation

Danger of explosion!

- Electrical installation requires additionally observance of EN 60079-14 or NEC 505.
- Explosion proof motors shall be connected through motor protection switch only

DANGER



Static charge

Danger of explosion!

- Use ground connection for earthing.
- Connect pump unit to foundation with suitable earthing-cable.

DANGER



Working on the pump unit by unqualified personnel

Danger to life through electric shock!

- Electrical connection must be performed by qualified electrician only.
- Regulations IEC 60364 and EN 60079 (Explosion proof) must be considered.

WARNING



Incorrect power connection

Short circuit!

- Adhere to connection conditions of local energy supply companies.

NOTE



Star-Delta starting leads to a high torque increase when switching from star to delta, this can cause decoupling of the magnets. Therefore, star-delta starting is not suitable for magnetic coupled pumps. In order to reduce the starting current, a soft-starter is recommended.

Proceedings:

1. Check for compliance of the available supply voltage with the indications on the motor name tag.
2. Select suitable connection method.
3. Check for identical rotating direction of motor and pump. Consider the rotating direction arrow of the pump!

NOTE



Observe the instruction manual of the motor!



5. Installation / Mounting

5.6.1 Checking rotating direction

DANGER



Temperature rise through parts touching each other

Danger of explosion!

- Never check rotating direction with dry pump.

ATTENTION



Wrong rotating direction of motor and pump

Damage of the pump!

- Consider the rotating direction arrow on the pump.

1. Start motor briefly. Note rotating direction of the motor.
2. Rotating direction of the motor must comply with the rotating direction arrow on the pump.
3. In case of wrong rotating direction, change the cables in the motor terminal box.



6. Commissioning / Decommissioning

6.1 Commissioning

The following points must be checked prior to start-up:

- The pump unit is correctly electronically connected to all relevant protective devices.
- The pump is filled with liquid.
- Rotating direction has been checked.
- All additional connections are connected and fully functional.
- After a longer standstill period, the measures mentioned in chapter 7 „Maintenance/Servicing/Inspection“ must be considered and performed.

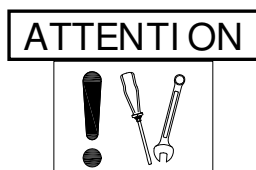
6.1.1 Filling the pump



Formation of explosive atmosphere inside the pump

Danger of explosion!

- The pump must permanently be filled with liquid.
- Appropriate monitoring measures must be provided.



Operation with empty pump

Damage of sleeve bearing / mechanical seal!

- Pump must always be filled with liquid.
- Provide appropriate monitoring measures.

1. Fill the pump with liquid.
2. Open shut-off valve in suction pipe completely.
3. Open all additional connections completely (e.g. external circulation, external flush)

6.1.2 Starting the pump



Exceedance of allowable pressure- and temperature limits

Danger of explosion! Leakage of hot or toxic liquid

- Never operate pump with closed shut-off valves in suction and/or discharge pipe.
- Start-up pump unit only against partially opened shut-off valve on discharge side.



Elevated temperature through dry run

Danger of explosion!

- Never operate pump in empty condition.
- Always fill up pump properly.
- Operate pump only within the allowable operating range.

1. Open shut-off valve completely in suction pipe.
2. Open shut-off valve partially in discharge pipe.
3. Switch on the motor. Pay attention to the synchronicity of pump and motor. Decoupling leads to low differential head and noise in the magnetic coupling.



6. Commissioning / Decommissioning

4. When the pressure gauge indicates pressure, open shut-off valve on discharge side until the duty point is reached.

DANGER

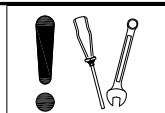


Elevated temperature through decoupling of the magnet coupling

Danger of explosion!

- Switch off pump unit immediately.
- Eliminate cause of malfunction.

ATTENTION



Operation without liquid

Damage of sleeve bearings!

- Pump must always be filled with liquid.
- Provide appropriate monitoring measures.

6.2 Operating the pump

WARNING

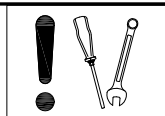


High surface temperatures through hot liquids

Risk of burns!

- Avoid touching the pump surface.
- Wear protective clothing.

ATTENTION



Abnormal noises, vibrations, temperatures or leakage

Damage of the pump!

- Switch off the pump immediately.
- Only restart the pump unit after cause of trouble has been eliminated.

6.3 Impeller trimming

Impeller trimming is not possible for this pump type.

6.4 Operating limits

DANGER



Exceedance of operating limits regarding pressure, temperature and speed

Danger of explosion! Leaking hot or toxic liquid!

- Maintain the allowable service conditions specified in the pump data sheet.
- Avoid operation against closed shut-off valve.
- Never operate pump at a temperature higher than specified in the pump data sheet.

6.4.1 Flow rate

If not stated otherwise in the pump data sheet, the following applies:

$$Q_{\min} = 0,15 \times Q_{\text{opt}}$$

$$Q_{\max} = 1,2 \times Q_{\text{opt}}$$



6.4.2 Switching frequencies

DANGER



Elevated surface temperature of the motor

Danger of explosion!

- When using explosion proof motors, consider the information in the motor manual regarding switching frequencies.

The switching frequencies are defined by the maximum temperature rise of the motor and depend on the power reserve of the motor during operation and on the starting conditions.

NOTE



Read instruction manual of motor manufacturer!

6.5 Switching off the pump

1. Keep shut-off valve in suction pipe open.
2. Close shut-off valve in discharge pipe.
3. Switch off the motor and watch for steady run down.

NOTE



In case a non-return valve is installed in the discharge pipe, the shut-off valve can remain open. A counter pressure must be available.

For a longer standstill period, the following must be observed:

- Liquids which tend to polymerization, crystallization or solidification, must be drained completely.
- If required, rinse the pump with a suitable liquid.
- Close shut-off valve in the suction pipe.
- Flush connections must be closed.

6.6 Decommissioning

The pump unit remains in the piping:

- Provide sufficient amount of liquid for the test runs.
- Switch on the pump unit regularly monthly or quarterly.

The pump unit will be dismantled and stored:

- Empty the pump properly.
- Observe the safety instructions acc. to chapter 7.1 / 7.3.
- Spray the inside of the pump casing with preservation agent. Not required for stainless steel pumps.
- Spray preservation agent through suction and discharge flange.
- Plug suction and discharge flanges, e.g. with plastic caps.
- Lubricate all unpainted outside surfaces of the pump with oil and grease free of silicone. Not required for stainless steel pumps.
- Pay attention to additional notes in chapter 4.2.



7. Maintenance / Servicing / Inspection

7.1 Safety regulations

DANGER



Improper maintained pump unit

Danger of explosion!

- Maintain the pump unit regularly
- Establish a maintenance schedule

DANGER



Strong magnetic field in the area of magnet coupling or single magnets

Danger to life for individuals with cardiac pacemakers!

Disruption of magnetic data medium, electric devices, components and instruments!
Uncontrolled attractive force between magnetic components, tools etc.!

- A safe distance of minimum 0,3 m must be maintained..

WARNING



Unintentional switching-on of the pump unit

Risk of injury through moving components!

- Works on the pump unit may only be done at disconnected electricity.
- Secure the pump unit against unintentional switch-on.

WARNING



Hot liquids

Risk of injury!

- Let the pump unit cool down to ambient temperature.

WARNING



Liquids dangerous to health

Risk of injury!

- Consider legal requirements.
- Take safety measures for individuals and environment when draining the pumped liquid.
- Decontaminate the pumps.

WARNING



Lack of stability

Squeezing of hands and feet!

- When assembling or disassembling the pump/pump unit, secure it against tipping and falling.

The user must assure that maintenance, inspection and assembly is performed by qualified personnel. These persons must have studied this operating manual comprehensively.

A maintenance schedule needs a minimum of effort and may avoid expensive repairs.

Any use of force on the pump unit must be avoided.



7.2 Operating surveillance

DANGER

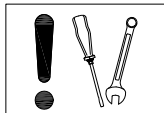


Elevated surface temperature through hot running antifriction bearings

Danger of explosion! Fire hazard!

- Check antifriction bearings regularly for running noise.

ATTENTION

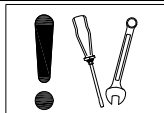


Wear caused by dry run

Damage of the pump!

- Never operate an empty pump.
- Never close the shut-off valve in suction pipe during operation.

ATTENTION



Exceedance of the allowable liquid temperature

Damage of the pump!

- Operation against closed discharge valve is not allowed.
- Consider the temperature indications in the pump data sheet..

The following requires regular checking during operation:

- The pump must always run steady and vibration-free.
- Check antifriction bearings for running noise. Vibrations, noises and increased power consumption are signs of wear.
- Clean the filter in the suction pipe regularly.

7.2.1 Lubrication of sleeve bearings

Sleeve bearings require a stable liquid film. Checking of wear must be done:

- after dry run or cavitation.
- when vibrations, noises and power consumption are increasing.

7.3 Drainage and Disposal

WARNING



Pumped liquids dangerous to life

Endangering for individuals and environment!

- Collect flushing liquid and possible residual liquid and dispose it.
- Wear protective clothing and face masks.
- Consider legal requirements concerning disposal of liquids.

Drainage of pumped liquids through the drain plugs at the casing, through a connected shut-off valve or through a flange.

Mode of drainage and position can be taken from the dimensional drawing !



7.4 Disassembly of pump unit

7.4.1 General instructions

- Pay attention to safety instructions of chapter 7.1.
- Working on the motor requires observance of the documentation provided by the motor manufacturer.
- Consider the sectional drawings when disassembling.
- In case of damage, our service department can be contacted.

DANGER



Working on the pump unit without sufficient preparation

Risk of injury!

- Switch off the pump unit properly.
- Close shut-off valves on suction and discharge side.
- Drain and depressurize the pump.
- Flush connections must be closed.
- Let the pump unit cool down to ambient temperature.

WARNING



Improper handling and lifting of heavy components

Personal injury and material damage!

- For handling heavy components use appropriate means of transport, lifting gears and slings.

7.4.2 Removal of driver

1. Disconnect the motor.
2. Remove the hold down bolts of the motor from the baseplate.
3. Remove hexagon nuts 920.2.
4. Pull off the motor with motor lantern 341 respectively intermediate pipe 712, motor flange 982 (WPM 23) and drive rotor 818.1.

WARNING

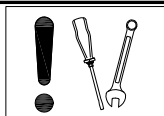


Tilting the motor

Squeezing of hands and feet!

- Secure the motor by lifting or bracing.

ATTENTION



Outer magnet is touching the containment shell

Damage of containment shell or outer magnet!

- Use guide rods!

7.4.3 Tools

No special tools are required for disassembly and assembly.



7.4.4 Disassembly of motor lantern / drive rotor

The works according to chapter 7.4.2 are completed.

1. Loosen inner hexagon cap screws 914.2.
2. Pull off motor lantern 341.
3. Loosen grub screws 904.1 in the rotor hub.
If available, loosen inner hexagon cap screw 914.5 and pull off the intermediate ring 506.
4. Pull off the drive rotor 818.1 from motor shaft.

7.4.5 Disassembly of containment shell

The works according to chapter 7.4.2 are completed.

WARNING



Possibly available residues of pumped liquid

Danger for individuals and environment!

- Wear protective clothing.

1. Loosen and remove inner hexagon cap screws 914.3.
2. Loosen containment shell by jack screws.

WARNING



Axial magnetic forces

Danger of squeezing fingers and hands!

- Use non-magnetic tools only.

7.4.6 Disassembly of impellers

The works according to chapter 7.4.5 are completed.

1. Clamp the socket wrench insert size 19 (1) in a three-jaw chuck (2). If needed use an extension (3).
2. Fit the pump with hexagon nut 920.3 to the socket wrench insert. Use wooden logs (4) for protection.
3. Loosen hexagon nuts 920.1.
4. Pull off discharge casing 107 together with sleeve bearing 310.
5. Loosen inner hexagon cap screw 914.4 (right hand thread).
6. Pull off shaft sleeve 524.1.
7. Remove start-up ring 500.1.
8. Remove the side channel stages as follows:
 - Pull off pressure disk 557
 - Pull off side channel impeller 235
 - Remove key 940.1 respectively woodruff key 941 (WPM 23)
 - Pull off suction disk 558
9. Pull off suction casing 106 together with sleeve bearing 310.

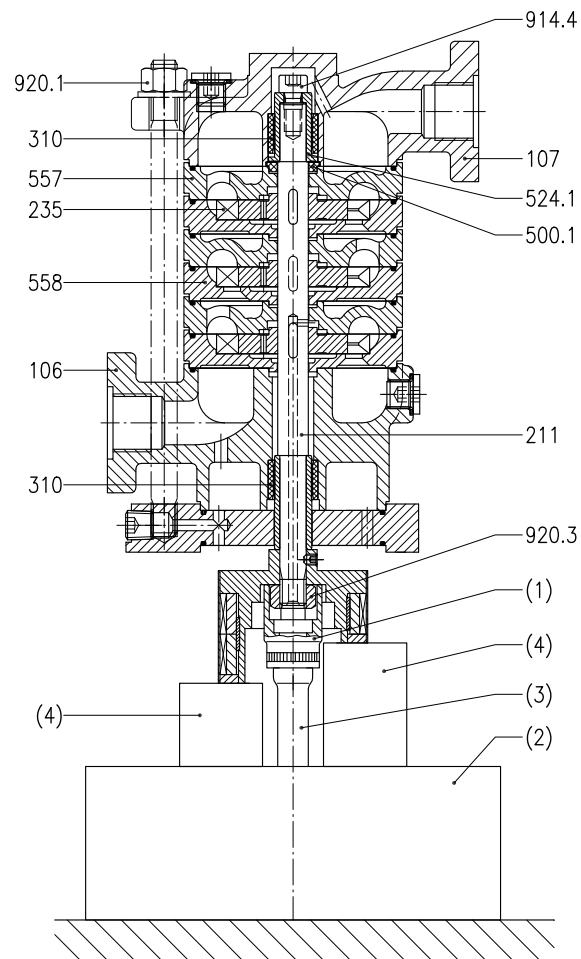


Fig. 5: disassembly of impeller

7.4.7 Disassembly of rotor

The works according to chapter 7.4.6 are completed.

1. Clamp the pump shaft in a vise.
2. Loosen hexagon nut 920.3 (left hand thread).
3. Loosen grub screws 904.2 from the rotor hub.
4. Pull off rotor 818.2.

WARNING



Axial magnetic forces

Danger of squeezing fingers and hands!

- Use non-magnetic tools only.
- Never place the rotor 818.2 near magnetic components.



7.5 Inspection

7.5.1 Impellers, suction and pressure disks

Selfpriming capability is highly dependent on the axial clearance between impellers and suction and pressure disks. The manufacturing tolerances are calculated such that the total axial clearance is 0,1 mm (WPM 10) respectively 0,15 mm (WPM 20/23). Natural wear will enlarge the clearance and reduce the selfpriming capability. Wear is very much depending on the nature of the pumped liquid.

Reliable statements about lifetime are therefore not possible. Replacement is generally recommended if traces of wear are distinctly visible.

7.5.2 Magnet coupling

Driven rotor 818.2

Surface must be free of cracks and bulges. Check parallelism by a straight edge.

Drive rotor 818.1

Replace outer magnets if mechanical or chemical damage is visible.

Torque capacity

Torques of new magnets are stated in the table below. Magnet length according to pump data sheet or name tag. After operation the reduction of torque is max. 10%. If reduction is more than 10% magnets must be replaced.

	Magnet length [mm]	Torque [Nm]
WPM 10 / 20	18	8,5
	36	18,5
WPM 23	36	16

7.5.3 SiC-Sleeve bearing / Shaft sleeves

Measure the diameters of the sliding surfaces. The total clearance in new condition is 0,133 mm. Replace sleeve bearings if the mentioned clearance is exceeded.

7.6 Assembly of pump unit

7.6.1 General instructions

- Consider the safety instructions of chapter 7.1.
- Consider the sectional drawings for assembly.
- Use new gaskets and O-rings only.
- Mount gaskets without lubricants.
- Do not use assembling aid when mounting the gaskets. If necessary, use customary contact adhesive. Never use superglue.
- Lubricate fittings and screw joints with graphite or similar lubricant. Lubricants must be compatible with the pumped liquid.
- Tighten all screws properly. Consider chapter 7.7.

**WARNING****Hitting of rotor against containment shell or of containment shell against coupling half through magnetic forces**

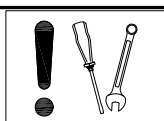
Damage of magnets and bearing! Risk of injury!

- Strictly follow the assembling instructions.

WARNING**Improper handling and lifting of heavy components**

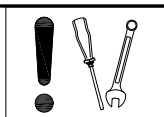
Personal injury and material damage!

- For handling heavy components, use appropriate means of transport, lifting gears and slings.

ATTENTION**Unprofessional assembly**

Damage of the pump!

- Assemble pumps / pump units under consideration of the general rules of engineering.
- Only use original spare parts.

ATTENTION**Improper mounting**

Damage of outer magnet coupling!

- Use guide rods.

The following must be checked prior to assembly:

- All dismantled parts are cleaned and checked for wear.
- Damaged or worn out parts must be replaced by original spare parts.
- All sealing surfaces are cleaned.

7.6.2 Assembly of rotor

1. Clamp the pump shaft in a vise. Use jaw chucks!
2. Slide the shaft sleeve 524.2 onto the pump shaft until limit.
3. Slide on the rotor 818.2 and fasten it with grub screws 904.2.
4. Tighten the hexagon nut 920.3 (left hand thread).

WARNING**Axial magnetic forces**

Danger of squeezing fingers and hands!

- Use non-magnetic tools.
- Never place the rotor 818.2 near magnetic components.

7.6.3 Assembly of impeller

The works according to chapter 7.6.2 are completed.

1. Place the driven rotor with the premounted pump shaft in a jaw chuck. Use socket wrench insert size 19 for the hexagon nut 920.3. Consider Figure 5
2. WPM 20/23: Slide on the intermediate flange 981 with screwed in casing screws 915.1.



7. Maintenance / Servicing / Inspection

3. Fit the suction casing 106 with shrink fitted sleeve bearing 310 in the centring of intermediate flange. Do not forget the O-ring 412.2 (WPM 20/23).
4. Assemble the side channel stages as follows: (Don't forget O-rings 412.1)
 - Slide on the suction disk 558
 - Insert key 940.1 respectively woodruff key 941 (WPM 23)
 - Slide on the side channel impeller 235
 - Slide on the pressure disk 557

NOTE



Suction and pressure disks are oppositely arranged and both provided with one wide and one narrow groove (WPM 10) respectively one single and one double groove (WPM 20).

The last pressure disk 557 must always be mounted with the single groove (WPM 20) or the narrow groove (WPM 10) face upwards to the discharge casing 107. The matching suction disk must also be installed with the single or narrow groove.

At multistage design, the double groove (WPM 20) respectively the wide groove (WPM 10) follows next and then in turn.

For WPM 23 the numbering acc. to the sectional drawing must be considered! Start at the suction casing with suction disk 558.1 and pressure disk 557.1. Then mount the pair of disks 558.2/557.2 and continue alternately.

5. Slide on the start-up ring 500.1.
6. Slide on the shaft sleeve 524.1 until limit.
7. Tighten the inner hexagon cap screw 914.4 (right hand thread).
8. Fit the discharge casing 107 with the shrink fitted sleeve bearing 310 in the centring of the last pressure disk 557.
9. Tighten the hexagon nut 920.1 by torque wrench.

7.6.4 Assembly of containment shell

The works according to chapter 7.6.3 are completed.

1. Fit the containment shell. Do not forget O-ring 412.2 respectively gasket 400.3 (WPM 23).
2. Tighten the containment shell screws 914.3 with a torque wrench.
Do not forget screw locking disks 936.

7.6.5 Assembly of motor lantern / drive rotor

1. Slide the drive rotor 818.1 onto the motor shaft.
2. Tighten grub screws 904.1. If available, insert intermediate ring 506 in the hub hole of the drive rotor and fasten it with inner hexagon cap screw 914.5.
3. Fit the motor lantern 341 respectively motor flange 982 (WPM 23) with premounted casing screws 915.2 / 3 and fasten it with inner hexagon cap screw 914.2.

7.6.6 Motor assembly

The works according to chapter 7.6.4 and 7.6.5 are completed.

1. Fit the pump unit to the motor lantern 341 respectively intermediate pipe 712 (WPM 23).
2. Use new gasket 400.1 (WPM 10/20 only).
3. Tighten hexagon nuts 920.2 by torque wrench.



WARNING



Tilting the pump

Squeezing of hands and feet!

- Secure the pump by lifting or bracing.

7. Maintenance / Servicing / Inspection

ATTENTION



Outer magnets are touching the containment shell

Damage of containment shell or outer magnets!

- Use guide rods.

7.7 Bolt Torques

	Bolt torque [Nm] A4-70
M5	4
M6	6
M8	16
M10	30
M12	55

Calculation basis:

- 80% Yield strength utilisation of screw material.
- Friction coefficient $\mu = 0,14$; use screw lubricant for threads and head / nut contact surface.
Recommended: Klüber-paste HEL 46-450.
- Torque controlled tightening by torque wrench.

NOTE



Deviating bolt torques are indicated in the pump data sheet.

Bolt torque for screwed plug G 1/4 = 25 Nm

Expansion screw nut 920.1 for WPM 23 - M16 x 1,5 = 105 Nm



8. Trouble shooting

Failure	Number
Pump delivers no or not enough liquid	1
Motor is overloaded	2
Pump is leaking	3
Increased noises and vibrations	4
Inadmissible temperature increase	5
Sleeve bearing damage	6
Suction capacity too low	7

Failure number							Problem	Elimination
1	2	3	4	5	6	7		
X			X	X		X	Pump or piping not completely vented or filled	Venting respectively filling
X						X	Shut-off valve in suction line not completely opened	Open shut-off valve
X						X	Air pockets in piping system	Correct piping layout Install vent valve
X						X	Wrong rotating direction	Exchange 2 phases of power supply
X	X						Counter pressure of the pump is higher than specified	Readjust the duty point by discharge valve Increase speed
X	X			X		X	Viscosity of pumped liquid is higher than specified	Consult the factory
X			X				Counter pressure of the pump is lower than specified	Readjust the duty point by discharge valve
X			X	X	X		NPSHA too low	Check liquid level in suction tank Reduce resistances in suction line Open shut-off valve in suction line completely
	X						Wrong speed	Check speed
			X				Pump stressed by piping	Check piping connections and pump mounting
			X		X		Unbalance of rotating parts	Balance the parts
		X					Casing screws and screwed plugs loose	Tighten the screws and plugs Renew gaskets
X							Motor is bigger than nominal capacity of magnet coupling	Install smaller motor Consult the factory
X							Star delta starting	Consult the factory

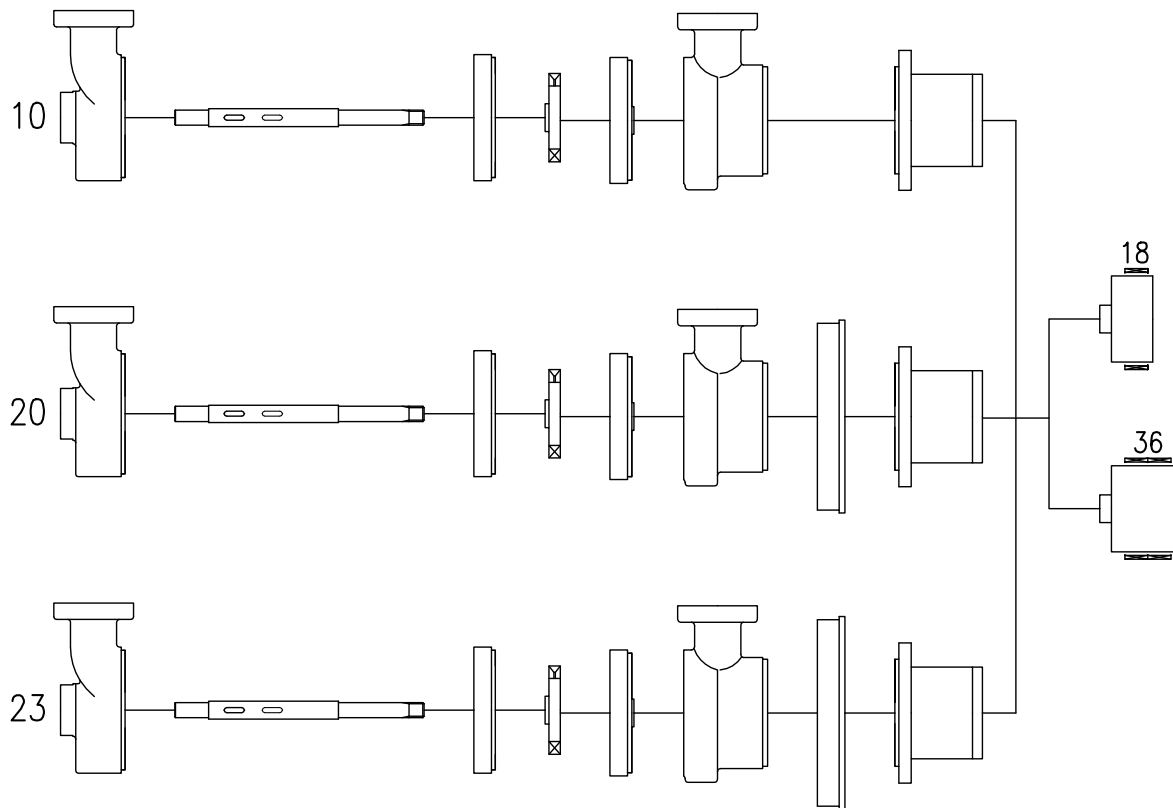


8. Trouble Shooting

Störungsnummer							Ursache	Beseitigung
1	2	3	4	5	6	7		
X				X	X		Torque of magnet coupling devalued	Check torque
			X	X	X		Rated flow too low	Increase rated flow
X			X	X			Magnet coupling decoupled	Shut down the motor and restart Check start-up safety Consult the factory
			X		X		Increased thrust load	Consult the factory
				X	X		Boiling point exceedance in containment shell area	Temperature monitor on containment shell Increase pressure in containment shell Increase minimum capacity
					X	X	Abrasive solids	Abrasive solids are not allowed Consult the factory
						X	Axial clearance of impellers too big	Replace parts
						X	Suction height too high	Check liquid level



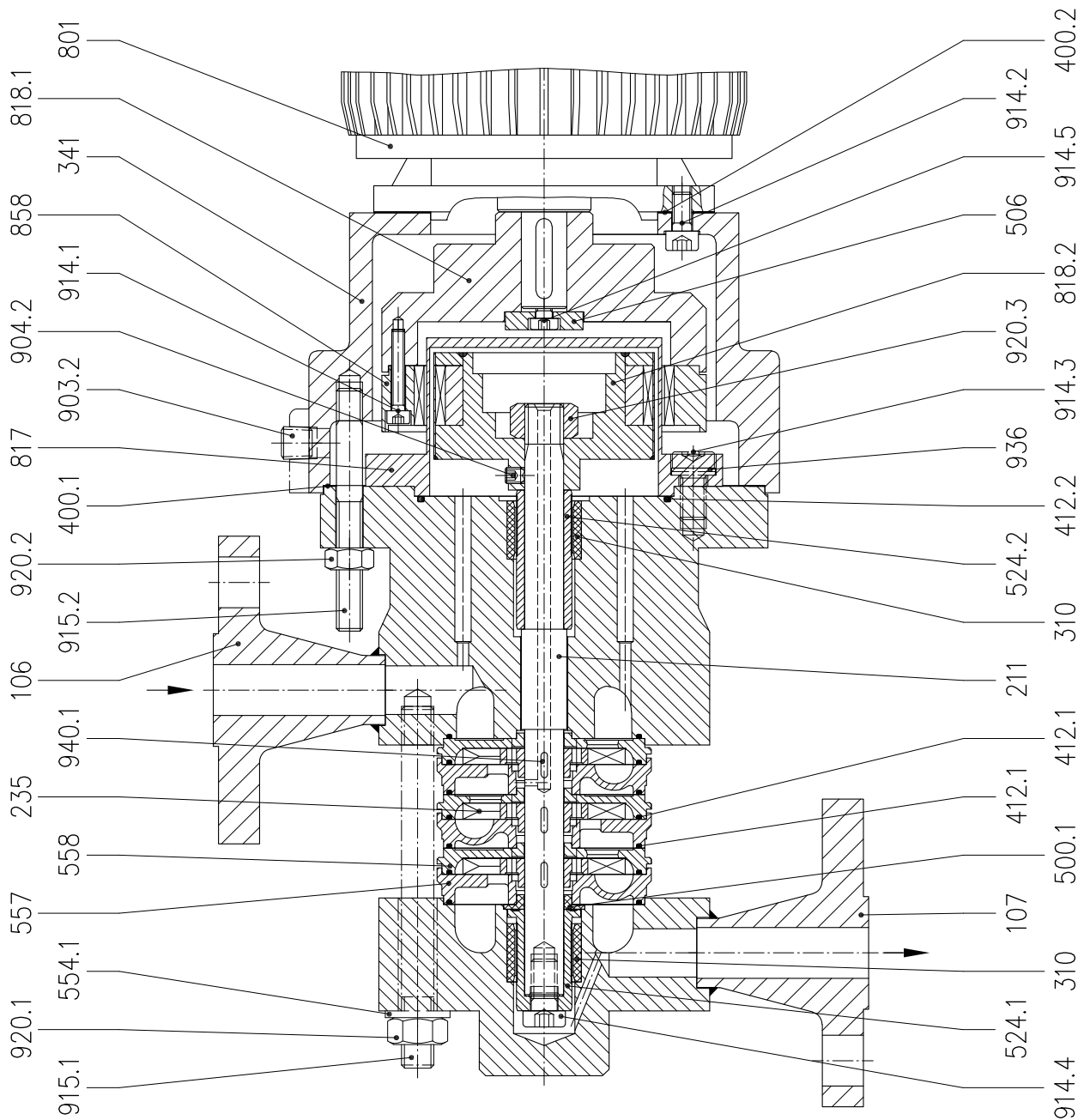
9. Interchangeability





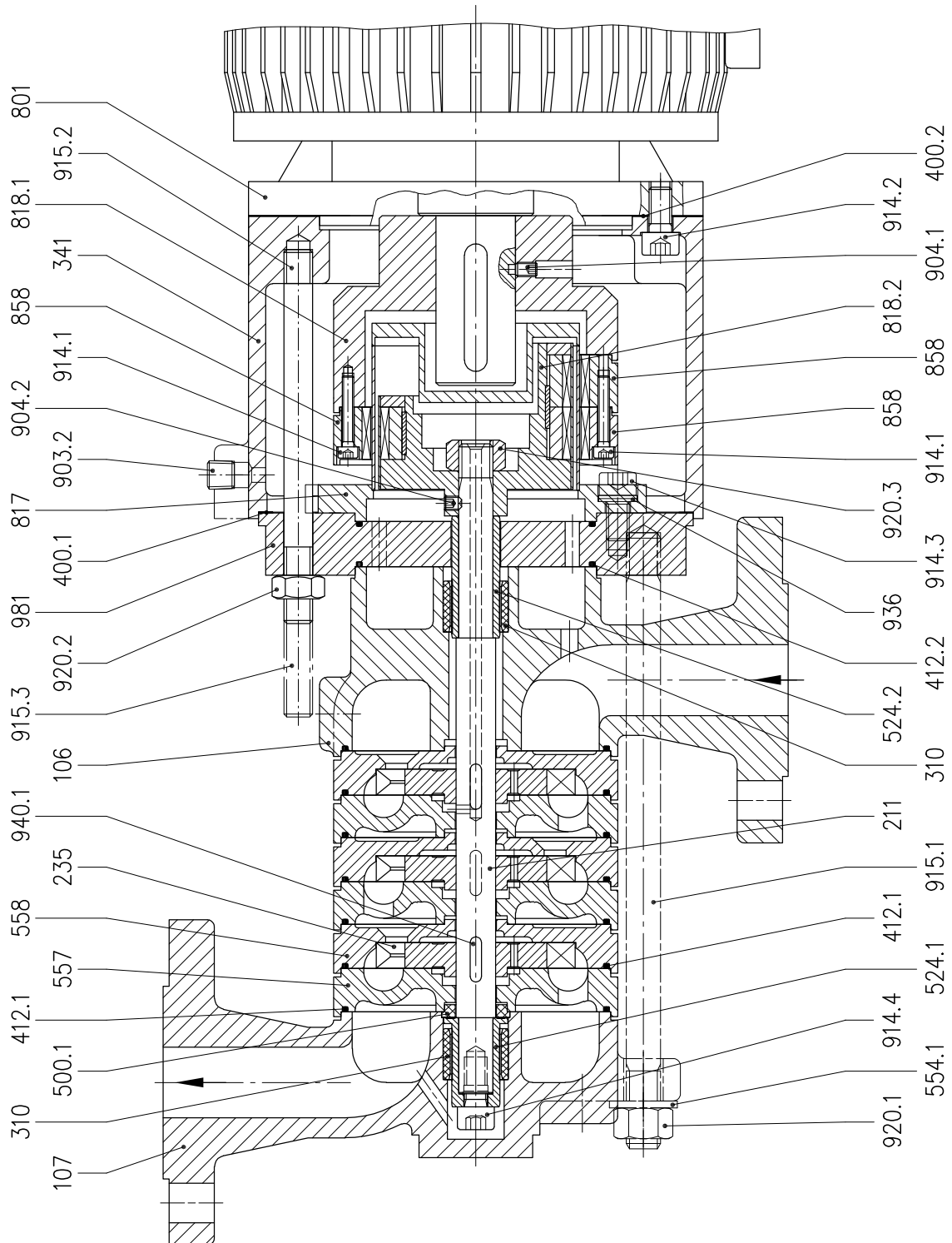
10. Sectional drawings

10.1 WPM 10





10.2 WPM 20

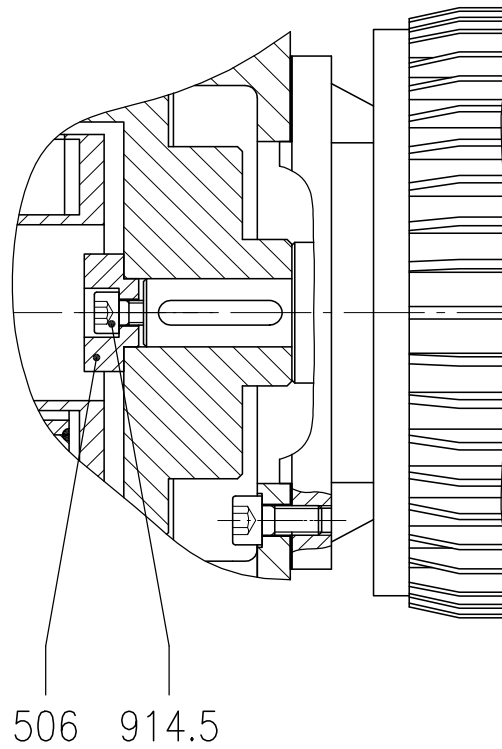


Top magnet coupling = 18 mm magnet length
Bottom magnet coupling = 36 mm magnet length

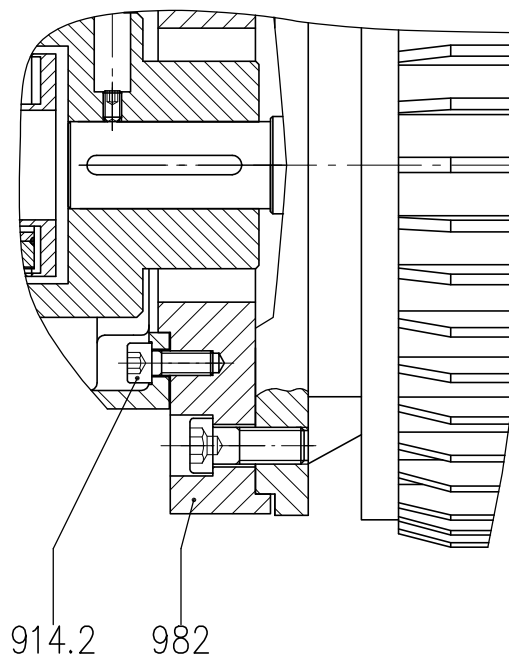


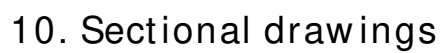
10. Sectional drawings

10.2.1 Motor size 71 - 90



10.2.2 Motor size 182/184 TC







11. Certificates

11.1 EC-Declaration of Conformity

EC-Declaration of Conformity

according to EC-Machinery Directive 2006/42/EG, Annex II, No. 1A

DICKOW PUMPEN KG
Siemensstraße 22
D-84478 Waldkraiburg

Herewith we declare that the pump unit described in the data sheet

Designation : Side channel pump
Type: WPM
Size :
Design:
Serial No.:

is in compliance with all relevant provisions of the EC-Machinery Directive 2006/42/EG.

Applied harmonized standards:

EN 809:1998+A1:2009+AC:2010	EN ISO 12732-1:2008
EN ISO 12100:2010	EN ISO 12732-3:2008
EN 12162:2001+A1:2009	EN ISO 20361:2009
EN 953:1997+A1:2009	

Additionally applied standards and technical specifications:

EN ISO 15783:2003+A1:2008	VDMA 24276:2001
EN ISO 9906:2012	


Waldkraiburg,

(Jürgen Konrad, Head of technical department DICKOW)

the responsible person is authorized to compile the technical documentation



11.2 Document of Compliance

	DICKOW PUMPEN	Document of Compliance
<p>Please fill in this statement for health innocuousness completely and attach it to the pump to be returned to the factory.</p>		
<u>Pump data</u>		
Type:	Serial No.: PB	
<u>Reason for shipment</u>		
<u>Contamination of the pump</u>		
<input type="checkbox"/> Hazardous liquids were <u>not</u> handled		
<input type="checkbox"/> Hazardous liquids were handled		
Pumped liquid:		
The pump has been		
<input type="checkbox"/> cleaned	<input type="checkbox"/> flushed	<input type="checkbox"/> breamed
The following safety measures must be taken before opening/repairing the pump:		
<u>Customer data</u>		
Company:	Phone:	
	Fax:	
Address:	E-Mail:	
Name:	Position:	
(Block Letters)		
This is to certify that the above mentioned pump has been proper cleaned/flushed/breamed and repair can be performed without risk.		
Date:	Signature:	