



BAUER

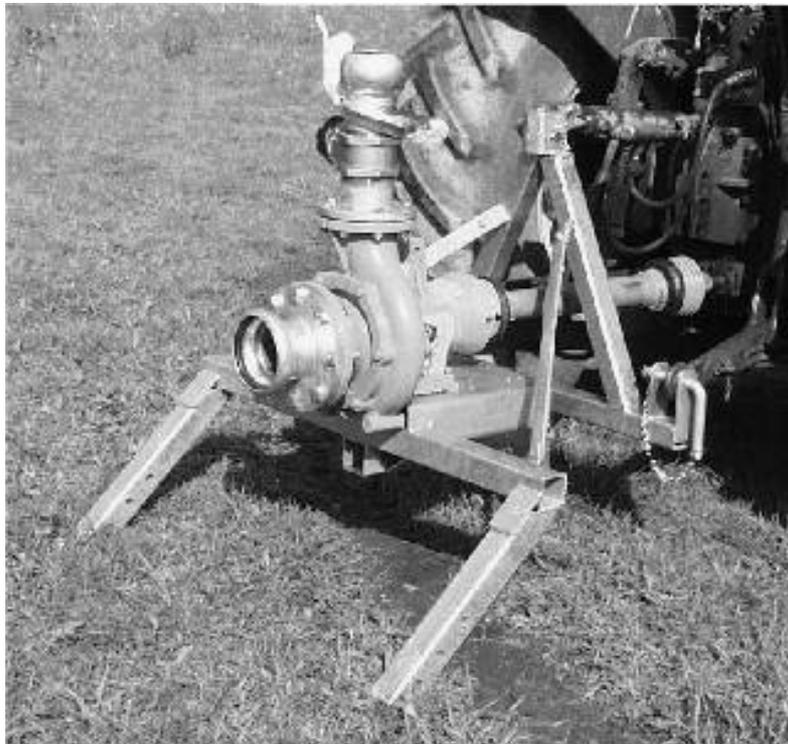
FOR A GREEN WORLD

OPERATING MANUAL

for

Gear Pumps

Magnum SM 540;
SM 1000 / SM 2000
without and with self-priming unit



Version IX-2008

*Gear Pump
SM 540/SM 1000
SM 2000
English*

INTRODUCTION

Thank you very much for purchasing a BAUER gear pump!

We are pleased to offer you a **BAUER gear pump** featuring state-of-art technology and top quality. This manual describes how to operate and maintain the **BAUER gear pump**. For reasons of clearness and due to the many possibilities this manual does not contain everything down into detail. In particular, it cannot possibly take into consideration every conceivable aspect of operation and maintenance.

If you need further information or if you should be faced with any particular problems for which this manual does not offer sufficient details please feel free to contact **BAUER company** at Kowaldstraße 2, A-8570 Voitsberg for the information you need.

Please note that the content of this operating manual neither constitutes part of nor does it alter any previous or existing agreement, promise or legal relationship. Any commitment on the part of **BAUER** is a result only of the individual purchase contract that also contains the complete and only valid warranty arrangement. Said contractual terms of warranty are neither extended nor limited by the content of the present operating manual.

All information contained in the present manual is based on the latest product details available at the time of printing.

BAUER reserves the right to change without prior notice, without assuming any liability!

BAUER gear pumps are designed for safe and reliable operation provided they are operated in compliance with the present instruction manual. In spite of the simplicity of the pump we therefore request that you read this manual carefully before putting your **BAUER gear pump** into operation! All instructions given for handling, operating and servicing the pump must be strictly observed. Provided these instructions are followed the pump will operate trouble-free to your full satisfaction for many years!

Non-observance of our instructions may result in injury or equipment damage!

| |
|---|
| This operating manual should be considered an integral part of the gear pump. Suppliers of new and used pumps are advised to put down in writing that this manual was handed over together with the pump. |
|---|

Please make this manual available to your operating personnel. You are kindly requested to state the pump type and serial number of the gear pump in all inquiries, correspondence, warranty problems or parts orders. These details are specified on the nameplate.

We hope you will enjoy working with your BAUER gear pump!

PRODUCT DETAILS

Type designation: Gear pump

Type number: MAGNUM SM 540
SM 1000 / SM 2000

Serial number¹: _____

Dealer:

Name: _____

Address: _____

Tel./Fax: _____

Date of delivery: _____

Manufacturer:

Röhren- und Pumpenwerk **BAUER** Ges.m.b.H.
Kowaldstr. 2
A - 8570 Voitsberg
Tel.: +43 3142 200 - 0
Fax: +43 3142 200 -320 /-340
e-mail: sales@bauer-at.com
www.bauer-at.com

Owner or operator:

Name: _____

Address: _____

Tel. / Fax: _____

Note: Please make a note of the type and serial number of your gear pump and its accessories! Be sure to specify these details every time you contact your dealer.

¹ In all warranty claims and correspondence relating to this machine it is essential to specify the complete serial number group including all letters. This applies to the machine itself and to any components involved. We cannot emphasise this point often enough.

GENERAL SAFETY INSTRUCTIONS

Symbols and terms



The CE symbol that has to be affixed on the machine by the manufacturer outwardly demonstrates compliance of the machine with the directives for machines and other relevant EU directives.



WARNING!

This "Warning" symbol refers to important safety instructions in this manual. Whenever you see this symbol be aware of possible injury hazards. Read the note following the symbol very carefully and inform the other operators accordingly.

CAUTION!

Non-observance of this instruction may cause damage to or destruction of the machine or individual components.

NOTE

It is important to observe this note or condition!

Qualified operators are persons who on account of their training, experience and instruction as well as their knowledge of relevant standards, rules, precautions to be taken for accident prevention and operating conditions, have been authorised by the person in charge of plant safety to perform the individual tasks required and in doing so are able to recognise and avoid potential hazards. Among other things knowledge of first-aid procedures is also required.

Product liability

As defined by the product liability law every farmer is also an entrepreneur!

According to §9 PHG (Product Liability Law), liability for damage to corporeal things caused by defective products is expressly excluded. This exclusion of liability also applies to parts not manufactured by BAUER itself but purchased from external suppliers.

Duty to furnish information

Even if the customer passes on the machine later-on he is obliged to hand the operating manual on to the new receiver too. The receiver of the machine must be instructed with reference to the mentioned regulations.

Intended use

- BAUER gear pump is built exclusively for normal use in agricultural applications (intended use).
- Any use beyond this normal use is considered non-conforming. Manufacturer is not liable for damage resulting from such non-conforming use, the sole liability for damage from non-conforming use is with the user.
- Intended use also includes compliance with the manufacturer's operating, maintenance and service instructions.
- The BAUER gear pump may be used and operated only by persons who are familiar with the device and aware of the hazards involved.
- All relevant rules for accident prevention as well as any other generally valid specifications and regulations relating to safety, work medicine and traffic law must be strictly observed.
- Unauthorised modification of the machine releases the manufacturer from liability for damage resulting therefrom.

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1 GENERAL INSTRUCTIONS FOR SAFETY AND ACCIDENT PREVENTION

Check the machine for operational safety before every start-up.

1. In addition to the instructions contained in this manual, all specifications generally valid for safety and accident prevention must be observed!
2. The warning and instruction signs affixed to the machine give very important instructions for safe operation. Observing them serves your own personal safety!
3. Never put the machine into operation unless all guards and safety devices are completely mounted and in their proper working position!
4. Acquaint yourself with all equipment components and controls as well as their respective functions before starting to work. It is too late when the device is already running!
5. The operator's clothes should fit tightly. Avoid wearing loose clothes!
6. When handling slurry always keep in mind that the gasses produced are highly toxic and extremely explosive in combination with oxygen. Therefore, open fires, light tests, sparking and smoking are strictly forbidden!
7. Utmost care is required with regard to gasses in slurry and dung channels at open valves to the preliminary pit, before the main pit, or at cross channels. The same applies to mixing and withdrawal points when mixers or pumps are running!
8. When handling slurry always ensure sufficient ventilation!
9. Keep the machine clean to avoid fire hazards!

Tractor-driven machines

1. Before starting inspect the area around the machine (Children) ! Make sure your view is unrestricted!
2. Riding on the machine during transport is forbidden!
3. Couple the machine according to instructions and fasten it only at the specified points!
4. Be especially careful when coupling the machine to the tractor or uncoupling it!
5. Always adjust the supports in the proper position when coupling or uncoupling the machine (stability)!
6. Always mount balancing weights properly at the points provided!
7. Observe restrictions pertaining to axle load, total weight, and transport dimensions!
8. Inspect and mount all items required for transport such as lighting, warning signals and possible safety devices!
9. Mounted or trailed machines as well as balancing weights influence road behaviour, steering and braking capacity. Therefore make sure that proper steering and braking are possible!
10. Consider the projection and/or centrifugal mass of the machine when driving in curves!
11. It is forbidden to stay in the working range of the machine while it is operating !
12. Keep out of the turning and swivelling range of the machine!
13. Only operate hinged hydraulic frames when nobody is in the swivel range!
14. Externally powered machines (e.g. hydraulic) bear a crushing and shearing hazard!
15. Nobody is allowed between the tractor and the implement unless the tractor is secured by the parking brake and /or wedges under the wheels!
16. Hinged supports must always be folded up and secured before driving away!
17. Secure the machine and the tractor against rolling!

Tractor-mounted machines:

1. Before a machine is linked to or detached from the three-point linkage, the control device must be shifted to a position in which unintentional lifting or lowering is impossible!
2. When using the three-point linkage the linkage parameters of both tractor and attached machine must correspond, if not, they have to be matched accordingly!
3. The three-point linkage bears crushing and shearing hazards!
4. When operating the external control of the three-point linkage never step in-between tractor and the machine!
5. When the machine is in the transport position always make sure that the tractor's links are always properly secured on the sides.
6. When driving on the road with the machine lifted the control lever must be locked against lowering!

Trailed machines

1. When a machine is coupled to the drawbar make sure that the coupling point provides sufficient flexibility!

**Power take-off (applies only to PTO driven machines)**

1. It is not allowed to use any other types of PTO drive shafts except those prescribed by the manufacturer!
2. Drive shaft guard tube and guard cone as well as the PTO guard – also on the machine side - must be mounted and in good working order!
3. When using a PTO drive shaft always observe the specified overlap in transport and working position!
4. Never connect or disconnect the PTO drive shaft unless the PTO is stopped, the engine turned off, and the ignition key pulled out!
5. Make sure the drive shaft is always connected and secured properly!
6. Attach safety chain to keep the drive shaft guard from rotating with the shaft!
7. Before you turn on the PTO make sure that the selected tractor PTO speed corresponds with the permissible implement speed!
8. Before starting the PTO make sure that nobody is standing in the danger zone of the machine!
9. Never turn on the PTO when the engine is turned off or during a transport drive!
10. When working with the PTO nobody is allowed near the turning PTO or drive shaft!
11. Warning! The PTO shaft may continue turning due to its centrifugal mass after the PTO has been turned off! Keep clear of the machine during this time and do not touch until the PTO shaft stands absolutely still!
12. For cleaning, greasing, or adjusting the PTO driven implement or drive shaft, PTO and engine must be switched off and the ignition key pulled out!
13. Place the disconnected drive shaft on the provided support!
14. When drive shaft has been removed put the guard on the PTO shaft!
15. If a defect occurs repair it immediately before starting to work with the machine!

Hydraulic system

1. Hydraulic system is under high pressure!
2. When connecting hydraulic cylinders and motors, make sure the hydraulic hoses are connected as specified!
3. Before coupling the hydraulic hoses with the tractor's hydraulic system make sure that the entire hydraulic system is pressureless both on the tractor and implement side !
4. Inspect the hydraulic lines at regular intervals and replace them immediately in case of defects or ageing. Replaced hoses must comply with the technical specifications of the implement manufacturer!
5. When looking for leaks use only suitable equipment because of the injury hazard involved!
6. Liquids emerging under high pressure (hydraulic oil) may penetrate the skin and cause serious injuries! An injured person must see a doctor immediately! Danger of infection!
7. Before working on the hydraulic system the machine must be lowered, the system depressurised and the engine turned off!

Electric-driven implements

1. All work beyond normal maintenance of the implement should be performed only by a professional electrician!
2. Defective or broken plugs and sockets must be replaced by a professional electrician!
3. Never pull a plug out of the socket at the flexible electric cord!
4. Extension cables for power supply should be used only temporarily! Never use such lines permanently as a substitute for the required fixed installations!
5. Flexible lines laid across traffic areas on the farm must have at least 5 m ground clearance!
6. Always turn off the power supply before you do any work on the machine!
7. Check all electric lines for visible defects before you put the machine into operation! Replace defective cables and do not start the machine before that!
8. Never use electric-driven implements in damp situations or locations exposed to fire hazard unless they are adequately protected against moisture and dust!
9. Covering electric motors may cause heat concentration with high temperatures which could destroy the operating equipment and cause fires!

Hand-operated devices (valves)

1. Because of the slurry gasses produced in the lines, no slurry is allowed to remain in closed pipelines – bursting hazard!
2. Lay the pipelines with sufficient inclination and make sure that the selected closing order of valves allows all lines to be drained completely!
3. Protect the valves against unauthorised handling!
4. If a valve gets jammed do not apply force! Use only the operating levers supplied with the implement!
5. Observe the permissible maximum operating pressure of valves and pipelines when pumps are operated!
6. Service only when the tanks are empty!

Maintenance

1. Never perform any maintenance, service or cleaning work or fault elimination steps unless the drive is turned off and the engine is standing still!
2. Check proper fit of all nuts and bolts regularly and tighten them, if necessary.
3. If maintenance work is required on the lifted machine always secure it by means of appropriate supports!
4. When exchanging tools with cutting edges always use proper tools and wear safe protective gloves.
5. Dispose of oil, grease and filters according to local laws and regulations!
6. Always turn off power before working on the electric system!
7. Before electric welding on the tractor and mounted machines the generator and battery cables must be disconnected!
8. Spare parts must meet manufacturer's minimum technical specifications! This is the case for instance with original spare parts for instance!

2 GENERAL

| | |
|---|--|
|  WARNING! | Apart from the mechanical hazards resulting from moving or pressurised parts, the operation of slurry handling devices may also involve danger resulting from slurry gasses. These gasses (carbon dioxide CO ₂ , ammonium NH ₃ , hydrogen sulphide H ₂ S, methane CH ₄) could cause poisoning as well as explosions. When operating in particular mixers, agitators, recirculation systems, stirring nozzles and slurry aeration systems one must always make sure that no gasses are allowed to penetrate into the stable from outside tanks (installation of siphon or stop valve). When slurry is handled inside the stable area sufficient forced ventilation in the stable area must be secured. |
|---|--|

BAUER products are designed and manufactured carefully and subject to a system of continuous quality control. MAGNUM slurry pumps fully meet the requirements of the agricultural practice. They are best suited for delivering all kinds of slurries from thin liquid manure to viscous mixtures containing solids such as straw, fibres or clots. A special chopper guarantees trouble-free performance without blockages. Short set-up times, easy handling and maximum performance reliability are further advantages of this pump series. Pump drive is mechanical from a drive shaft onto the PTO input shaft of the pump's gearbox.

Although the pump is simple in design you should study this manual carefully and strictly observe all operating and service instructions contained . On this condition your slurry pump will operate to your full satisfaction for many years!

Make this manual available to all operators handling the equipment. Serial number and pump type are stamped in on the nameplate. Please specify these data in your inquiries, correspondence, warranty matters and parts orders. We warrant for this pump according to our General Terms of Sale.

3 DESCRIPTION

MAGNUM slurry pumps are designed with a special chopper on the suction side. This chopper guarantees trouble-free operation also if the pumped slurry contains solids like straw, fibrous materials, and clots or sludge up to not more than 12 %. Maximum permissible slurry temperature: 80°C.

3.1 Gear pump without self-priming unit

This pump mainly consists of the spur gear and the volute housing with impeller and cutting flange and the chopper assembly. Power is transmitted directly from the tractor and a drive shaft to the gearbox of the pump. The pump is preferably mounted on a pump trolley and hitched to the tractor's toolbar. While the pump is operating the drive shaft should be articulated as little as possible to ensure easy running and longer life of pump, gearbox, and drive shaft. Volute housing and gearbox are sealed off by a mechanical seal.

3.1.1 Suction line

The suction line must be equipped with a manual, lever operated foot valve. Suction line and pump must be filled with water before starting up the system.

3.1.2 Delivery line

We recommend to mount a stop valve in the delivery line. This is an advantage if pump operation is interrupted only for a short while. Closing of the stop valve and the foot valve will save renewed filling of pump and suction line when pumping is continued.

3.2 Gear pump with self-priming unit

This pump is a self-priming gear pump as described under 3.1 equipped with an additional attachment.

3.2.1 Suction line

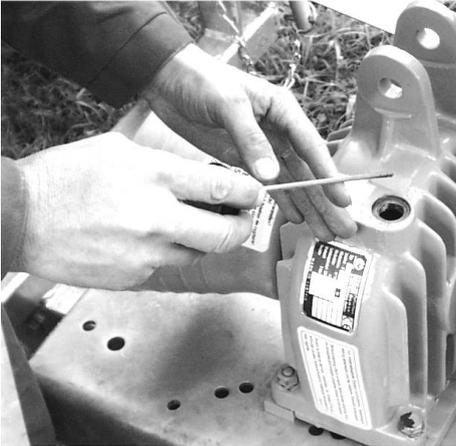
Being equipped with a self-priming unit, a standard spiral suction hose and suitable fitting pipe with a coupled funnel can be used as a suction line.

3.2.2 Delivery line

It is absolutely necessary to install a stop valve in the delivery line. This valve must be closed during the priming process, otherwise slurry would be sucked in through the delivery line and the suction line would not be filled.

4 PUTTING INTO OPERATION

4.1 Gear pump without self-priming unit



WARNING!

Check oil level in the gearbox and in the oil reservoir before every start!

Position the pump as close to the pumped medium as it is safe to do so.



- Couple the suction line with the pump's suction connection and close the foot valve.
- Always use the shortest possible suction pipe
- Check that all connections are air-tight and that the suction hose is in good condition
- Always ensure the pumped medium is homogeneous – DO NOT OVER MIX! Air in the slurry affects performance & can cause serious pump damage by cavitation.
- Difficult suction conditions can seriously affect the performance of the pump and lead to cavitation





- Fill up pump and suction line completely with water through the delivery socket.



- Connect the delivery line and close the stop valve in the delivery line.



- Connect tractor and pump by means of the drive shaft.

**WARNING!**

Use drive shafts with shear pin couplings only!
Refer to separate drive shaft manual for length adjustment, profile tube overlap and maintenance!

**WARNING!**

Do not raise or lower pump on tractor hydraulic linkage while PTO shaft is turning



- Engage the PTO, run up at low engine speed, and open the foot valve of the suction line.



- Slowly open the stop valve and **keep the PTO speed** constant until the pumped medium is distributed by the spreading device at the end of the delivery line.
- Do not fill the delivery line too quickly. Cavitation can occur under these conditions & the pump can become damaged very quickly



- **Increase PTO speed gradually** until the desired operating pressure and discharge rate are reached.

NOTE! The pump does not always need to be operated at maximum operating speed.

Always choose a speed that is just sufficient to obtain the desired performance.

Failure to this instruction could increase fuel consumption, pump wear-out rates and possibly damage other parts & the pumping system

NEVER WORK THE PUMP IN CAVITATION !



4.2 Gear pump with self-priming unit



WARNING!

Check oil level in the gearbox and in the oil reservoir before every start!

Position the pump as close to the pumped medium as it is safe to do so.



- Couple the suction line with the pump's suction connection.
 - **Always use the shortest possible suction pipe**
 - **Check that all connections are air-tight and that the suction hose is in good condition**
 - **Always ensure the pumped medium is homogeneous – DO NOT OVER MIX! Air in the slurry affects performance & can cause serious pump damage by cavitation.**
 - **Difficult suction conditions can seriously affect the performance of the pump and lead to cavitation**
-
- **Always fill up the pump** with about 3 litres of water through the side branch of the delivery socket.





- Couple the delivery line and close the stop valve in the delivery line.



- Connect tractor and pump by means of the drive shaft.



WARNING!

Refer to separate drive shaft manual for length adjustment, profile tube overlapping and maintenance!



- Make connection between side branch and tank (quick coupling).



- Open stop valve in the branch.

- Engage the PTO and run the tractor at about 300 rpm drive speed.



- Shift lever to position 2 (lift up) and hold it until the pump is filled.


WARNING!

If the pump is not filled after this procedure check all connections and hoses for absolute tightness. A trapped ball or a rubber that has not been positioned correctly could be another cause for failure. Leave the oiler open to ensure optimum performance of the self-priming unit



- Close the stop valve in the branch.



- **Slowly open the stop valve in the delivery line and keep the PTO speed constant until the pumped medium is distributed by the spreading device at the end of the delivery line.**
- **Do not fill the delivery line too quickly. Cavitation can occur under these conditions and the pump can become damaged very quickly.**

- **Increase PTO speed gradually until the desired operating pressure and discharge rate are reached.**



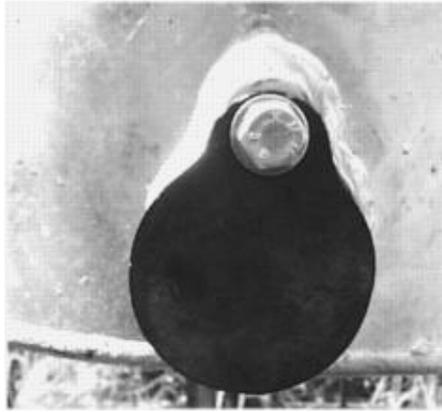
- **Increase PTO speed until the desired operating pressure and discharge rate are reached.**

NOTE! The pump does not always need to be operated at maximum operating speed.

Always choose a speed that is just sufficient to obtain the desired performance.

Failure to this instruction could increase fuel consumption, pump wear-out rates and possibly damage other parts & the pumping system

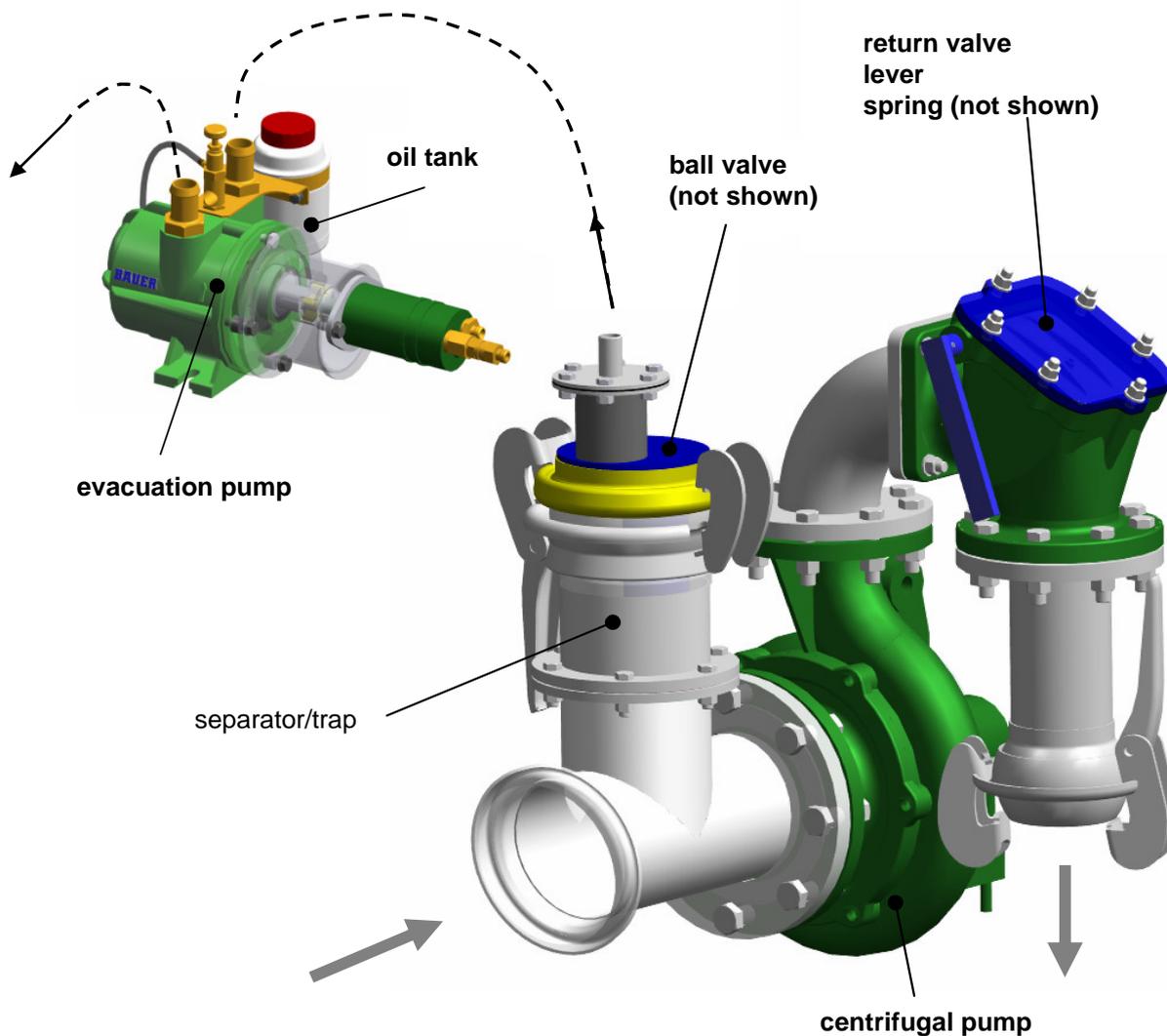
NEVER WORK THE PUMP IN CAVITATION !



 **WARNING!** Do not engage or disengage PTO abruptly to avoid shocks and pressure hammers.

4.3 Self-vacuum system for centrifugal pumps

Function and design





The **centrifugal pump** is not able to take in the medium (water or manure) itself – this is done by the self-vacuum device.

In the suction pipe, negative pressure is generated by means of the **evacuation pump**; thus the pipe and the pump are filled with the medium.

Manure must by no means get into the evacuation pump! This is achieved by means of a valve system in the **separator/trap**.

Do not switch one valve ball for the other (they are the same size, but are different in weight!).

With the **mechanic self-vacuum device**, the evacuation pump is driven together with the centrifugal pump by means of a V-belt. For suction purposes, the belt is tensioned by means of a hand lever (V-belt drive not shown in drawing).

Once the vacuum pipe is filled, the valve ball closes the separator and negative pressure is created on the intake side of the evacuation pump (note the difference in the sound the pump makes).

The imminent end of the suction process is indicated by movements of the vacuum hose.

Release the belt tightener. The centrifugal pump starts to deliver.

The **return valve** in the pressure line opens (only slightly at first). After 10 to 15 seconds, the pump should have built up full pressure and the return valve opens entirely.

The lever (on the outside of the return valve) is only used for indicating the operating condition. The return valve need not be pressed closed with the lever during the suction process.

The **spring** supports closing of the return valve after the centrifugal pump has been switched off.

With the **hydraulic self-vacuum device** the centrifugal pump need not (should not) run during the suction process. The self-vacuum system can be operated directly from the tractor.

Near the end of the suction process connect the centrifugal pump and switch the evacuation pump off. (Do not let the evacuation pump continue to run, this would only cause unnecessary heating and wear).

After the **pumping process has been concluded**, the return valve closes and the vacuum line remains filled (!). At the next start, there is no need to switch on the evacuation pump – the centrifugal pump starts delivering immediately.

For **emptying the intake line** open the **ball valve** at the separator/trap.

Operating instructions:

- Make sure the oil tank of the evacuation pump is filled.
- Close the ball valve (on the separator/trap) before the suction process starts

Error / - Possible causes / ⇒ Remedies / Comments

The (hydraulically driven) evacuation pump does not rotate.

- Hydraulic lines (on the tractor) incorrectly connected

⇒ Connect lines anew

Do not operate the evacuation pump with incorrect direction of rotation, as this would prevent lubrication.

This is the reason why there is a return valve on the hydro-motor.

The (hydraulically driven) evacuation pump rotates too slowly; the suction process takes too long

- Tractor speed too low; too little hydraulic oil delivered

⇒ Increase tractor speed

Avoid overspeeding of the hydraulic motor! (The maximum speed of 1550 rpm corresponds to an oil flow of 20 l/min). This is why there is a throttle on the hydraulic motor to limit the amount of oil and thus the speed. If, however, there is not enough oil provided by tractor hydraulics, the hydro motor will not reach full speed.

The evacuation pump does not take anything in – the lever on the return valve can be moved easily

- (a) leakage in the intake line
- (b) intake line clogged
- ⇒ re (a) Check intake line and seals
- ⇒ re (b) Rinse separator/trap

When the evacuation pump is taken into operation, the return valve is closed because of the negative pressure – the lever on the return valve can only be moved with great effort. In case of leakage or clogging, no negative pressure can be built up.

Note: If the intake hose is only pushed through the surface scum of the manure cistern, or if the content of the cistern is not properly mixed, solid components may be taken in that clog the intake line.

The suction process takes very long and the centrifugal pump cannot deliver any more; the water column (liquid manure) breaks down:

- (a) slight leakage in the intake line
- (b) suction height too high; medium too viscous
- ⇒ re (a) Check intake line and seals
- ⇒ re (b) Reduce suction height and/or add water

The evacuation pump is slightly more powerful than the centrifugal pump. If there are slight leakages or if the suction head is too high, the evacuation pump may be able to fill the intake line, but the centrifugal pump is no longer able to deliver the medium.

Note: If the liquid manure is very viscous, only half the suction height compared to water can be achieved.

5 PUMP SHUT-DOWN

5.1 Gear pumps with and without self-priming unit

Close the stop valve in the delivery line and lower the speed until the engine stops. Then disengage the PTO. Now open the stop valve slowly allowing the liquid still remaining in the pipes to flow back into the pit and release overpressure.

If only a short interruption is planned we recommend to close the valve. This will save renewed filling of the pump.

If the pump is moved to a different position the counter-pressure must be released as described above. When the pump is uncoupled sufficient liquid remains in the pump and it is not necessary to fill it up again for instance with water before putting the pump into operation again.

6 SERVICE AND MAINTENANCE

It cannot be emphasised often enough how much proper service and maintenance influence performance reliability and service life of a machine.




WARNING!

The pump and all its accessories should be cleaned immediately after use. As long as the slurry has not dried up it can easily be rinsed off with water. Shortly rinse the pump at low speed with clear water fed through the rinsing connection after every use.

The best way to clean the interior of pipes and fittings is to pump water through the system for several minutes with the pump running at PTO idle speed.

- The pump should be stored in a weather-protected place, preferably in a shelter. In areas where frost is likely during the winter season the pump housing must be drained completely by the impeller to spill out the remaining water.
- The gearbox oil should be exchanged for the first time after 50 and after that every 2000 hours of operation, but at least once a year.
- The mechanical seal is made of high-strength materials. The oil reservoir provides it with liquid (hydraulic oil – e.g. 0.4 l Shell Tellus S22) so the seal will not even be destroyed if the pump runs dry for a short while.
- Functional check-up of the mechanical seal is limited to visual inspection of the oil level in the oil reservoir. If liquid emerges from the oil reservoir while the pump is running or if the predetermined oil level cannot be reached, the sealing must be checked for damage (foreign objects).
- Always replace both rotary and stationary seal ring at the same time.
- We recommend to rinse the pump with water before it is dismantled. In doing so, foreign objects can be washed out and the mechanical seal would be tight again.
- Observe local laws and regulations when disposing pumps and pump components after repairs and service or when a pump is withdrawn from service. This applies in particular to residual slurry in the pump body.

6.1 Mounting instructions for mechanical seal Ø 50 for SM 1000 / SM 2000 and SM 3500



Accessories for mechanical seal assembly

Loctite 242 for securing the threaded bolts of the mechanical seal.

Adhesive tape for covering the sharp edges of the key groove.

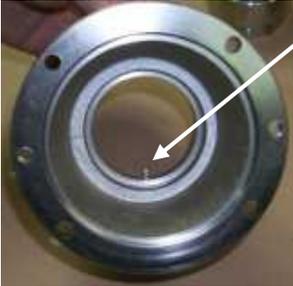
Molykote for lubricating the sliding faces of the O-rings.

Allen key for threaded bolts of the mechanical seal.

Knife for cutting the adhesive tape.



Assembly kit for adjustment of the functional length of the mechanical seal.
Sleeve
Washer
Nut



Do not forget to insert the anti-rotation lock pin of the stationary seal ring in the seat.

To protect the O-ring of the rotating element, cover the sharp edge of the key groove, only up to the end of the cone.



Spray the O-rings with Molykote to reduce friction.
 (water, alcohol, or silicone grease are suitable, too).



Mount the stationary seal ring
 Groove and anti-rotation lock pin must be in alignment.



Preparing the rotating collar.

Remove the threaded bolt



Moisten the thread with Loctite



Spray the O-ring with lubricant inside



When mounting the rotating collar ensure that bolt and groove are properly aligned (misalignment will bend the pin when force is applied and the spring is pressed away ensuing excessive pretension of the sliding faces).



Press on the mechanical seal with the help of the sleeve (remove the sleeve again).



Insert the disk.



Mounting the collar

The disk must be positioned in such a way that the threaded bolts are accessible through the slot.



it the space-adjusting nut - mounting length $47,5 \pm 0.5\text{mm}$.



Tighten the nut by hand.

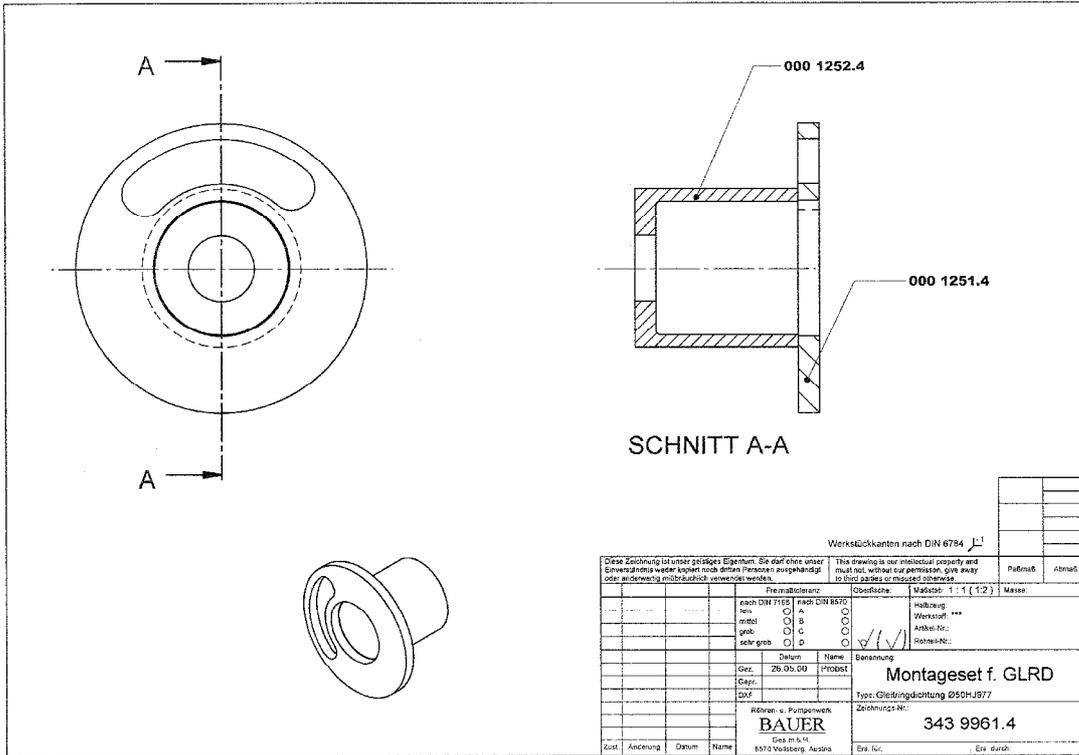


Use Allen key to tighten (fix) the threaded bolts that have been moistened with Loctite.



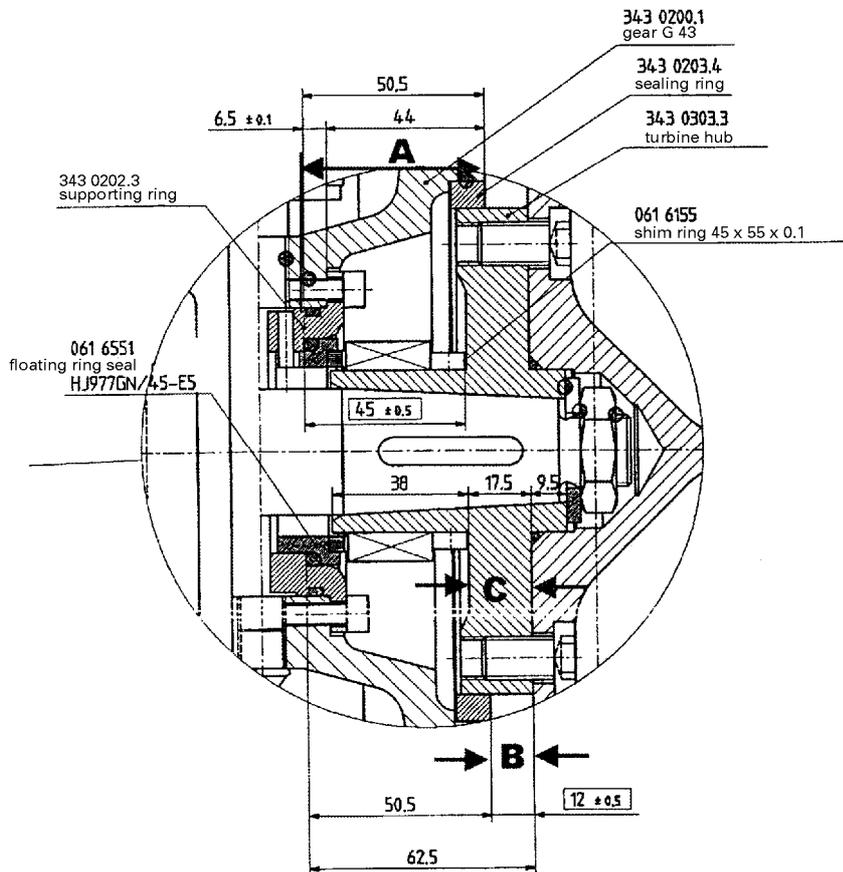
Remove the adhesive tape.

The assembly kit mentioned in the manual is available on request.



6.2 Mounting instructions for mechanical seal Ø 45 for pump SM 540 - Part Nr 061 6551

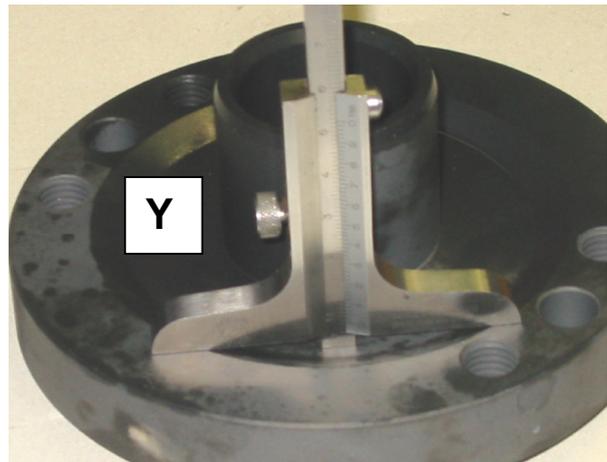
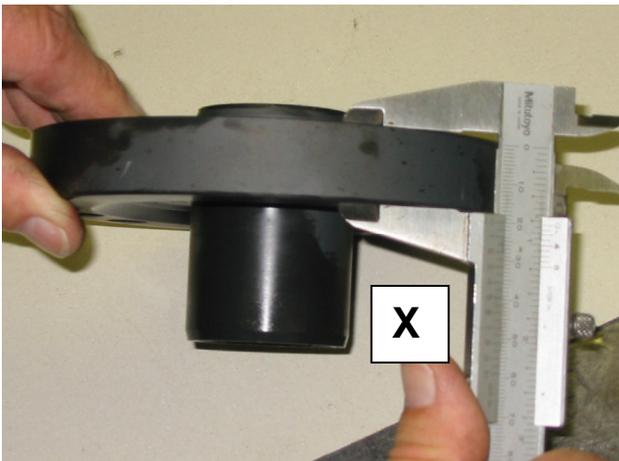
Sectional drawing for the mechanical seal with mounted hub and impeller



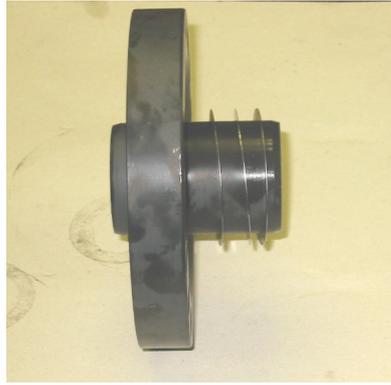
Before assembling hub and impeller



- 1) Measure the distance „A“ from plain on insert part nr 343 0202 to the plain of gear housing
- 2) Measure the thickness of the hub flange on the inner part of the flange distance „C“
„X“ minus „Y“ = distance „C“



- 3) Measure the distance „B“ – Measure between gear housing to the plain for hub:
For measuring this distance, it is necessary to install the hub on the gearshaft without key and fasten the nut on the shaft with torque 250 Nm. Afterwards dismount the hub.
- 4) Calculation for needed shims :
Distance „A“ plus distance „B“ minus distance „C“ shall have a value of 45 +- 0,5 mm.
When a higher value as 45 mm+-0,5 mm exists it is necessary to put shims on the hub, to get exactly this value. This measurement is absolutely necessary to have the correct load tension on the mechanical seal.
- 5) Put the calculated number of shims on the hub



- 6) Install the mechanical seal, the key and the hub with right number of shims on the pump shaft and fasten again the hub with torque of 250 Nm.

7 INSTRUCTIONS FOR SAFE AND TROUBLE-FREE PERFORMANCE

Starting up the Pump

1. Positioning the Pump

2. Attaching the suction line

Equip the suction line with ORIGINAL Bauer coupling parts

Never mount the suction line hanging from the pump (no strain relief).

Always mount the suction line in a rising position (no sagging –entrapped air)

The suction line must be absolutely leak-tight.

Always dimension the suction line in accordance with the discharge capacity required.

For discharge higher than 150m³/h you must use a suction line size 8" (HK 194).

3. Attaching the delivery line

The centrifugal pump must always be equipped with a control valve in the delivery line.

4. Check the oil level in the gearbox and in the oil reservoir.

5. Attaching the p.t.o. shaft

Always use p.t.o. shafts with shearing pin

P.t.o. shaft should only be slightly bend

(additional transverse moment for inlet shaft of gearbox)

Start the p.t.o. shaft at low power take-off speeds

6. For safety reasons of the mechanical seal, fill the pump with water on initial operation.

7. Operating with self-priming Unit (semiautomatically with valve)

When using the evacuation pump (compressor) for priming, always make sure that the delivery line valve is not completely closed (If completely closed, the valve builds up back pressure of air, which jams the pump on building up pressure i.e. priming stops).

CAUTION ! If priming takes longer than 60 to 90 seconds, some points need checking:

- 7.1. Check if suction line is tight (rubber sealing ring, gaskets and hoses)
- 7.2. Check the delivery line valve
- 7.3. Inspect compressor hoses and sealings
- 7.4. Check if the ball got stuck in the branch line / trap
- 7.5. Ball cock not closed in the branch line / trap
- 7.6. Check if compressor lamellas are blocked (compressor overheated – this can only happen after very long continuous operation or if the pump is soiled.
- 7.7. Defective mechanical seal

When priming is completed, fill up the pipeline by slowly opening the delivery line valve (close the ball cock to the compressor).

CAUTION ! If the delivery line is very large-dimensioned or if the valve is opened quickly at simultaneously increasing speed (no counter-pressure builds up), the pump very quickly starts cavitating. In this condition seal damage is very likely in short time.

Also note that at low speed with the valve open, the pump always remains in critical operating condition (cavitation) if only the speed is increased without counter-pressure.

When large pumping systems are involved, the entire system must first be filled with the valve half-closed and then the required operating condition must be established by speed increase and adjustment of the valve.

Except during suction with mechanical self-priming unit – **pumping against the closed valve is forbidden.**

Note also: the higher the dry matter content, the lower the suction height (suction capacity).
Bigger sized suction lines and smaller drive speeds have a positive affect to the entire pumping operation.

The suction capacity of the evacuating pump is sufficient for filling the suction line inspite of minor leaks (rubber ring with a small crack), but the centrifugal pump is unable to build up pressure because the suction flow breaks off due to the air leak.

This problem cannot be solved by increasing the drive speed.

Increasing the speed of a pump not working (suction flow break-off) increases the danger of dry run and subsequent seal damage.

Never exceed the **maximum driving speed** indicated on the nameplate.

Higher driving speeds increase the circumferential speed at the mechanical seal and the ensuing heat build-up to such an extent that thermal stress cracking or insufficient seal face lubrication are caused.

When the pump performance time is very long, check the gearbox temperature (should not be higher than 90°C).

Rinse and clean the pump after every use.

Conveying viscous fluids

With increasing viscosity (viscous fluids) of the pumped fluid at a constant speed, the output and discharge head decrease at increasing power absorption. The summit of the descending efficiency curve moves to the left – as shown on the diagramme.

Besides, the pump is more sensitive to reduced output and to breaking the output if the share of viscous fluids in the pumping medium grows.



Cavitation

By cavitation or building of a cavity, we understand the immediate coming and going of steam bubbles in a liquid flow.

Steam bubbles appear when the static pressure of the liquid decreases because of the growing absolute speed or when the geodesic height sinks to the level where the steam pressure pertinent to the liquid temperature is reached.

Yet, before material is removed because of the immediate breakup of the steam bubble, cavitation causes an increasing noise level and a run with disturbances, because the pump efficiency rate and the manometric head go down.

If, however, the pump is operated over a longer period of time while cavitation is ongoing, the disturbed run of the pump can cause the pump shaft to vibrate, which again can cause the opening of the slide ring sealing.

Slide ring sealing

The slide ring sealing HJ 977 GN is independent of rotational directions and is, because of its spring alignment, ideal for material containing solids and highly viscous material.

To function properly, it is important to comply with the given mounting length.

The oil reservoir must always be filled with oil.

After operation the sealing room must be cleaned quickly (rinsed) with a pure liquid (water).

If, for any reason, the cleaning is not done, the sealing might get aggluminated with the dried-up slurry, which has a negative effect upon a new start. , e.g. dry run, insufficient lubrication, cracks – failure of the sealing

Factors that influence the pump wear

General information

Important influential elements for the safety and the life of the centrifugal pump are operational, i.e. ones that occur during the pump operation

The pump is laid out for certain performances. If operated outside its capacity, you have to expect operational conditions, that can have a detrimental effect on its operational safety and life.

One is the operation of the pump with a closed valve.

The problematic zones in such an operational condition are:

- Increased axial thrust, which means an early wear of the bearing.
- **Premature destruction of the mechanical seal.**
- The spiral exerts an additional hydraulic power on the impeller as a consequence of the asymmetric hydraulic burden
- Increased temperature of the pumping medium and the insufficient release of heat. In extreme cases the pump can become a bomb under such operational conditions and explode.
- Also a problem is the operation in an oversized pipe network. The pump becomes instable and shows unfavorable vibrations.

In addition, take care that the pump does not run in cavitation. (decrease in pump capacity and efficiency rate)

The cavitation is accompanied by a disturbed run, a weird cracking sound and in severe cases the vibrations of the entire pump.

In severe cases of cavitation, the channels of the impeller of the centrifugal pump can be blocked by the steam bubbles in a way that the delivery stalls completely.

Highly abrasive material

Cleaning

Maintenance

Do not run the pump to its limits (permanently)

8 TECHNICAL DATA

| | | SM 540 | SM 1000/ SM 2000 |
|--|-------------------|---------------|-----------------------------|
| Driving power | kW | 55 | 108 |
| Driving speed | min ⁻¹ | 540 | 1000 |
| Discharge | m ³ /h | 40-200 | 40 - 300 |
| Manometric head | m | 95-52 | 142 – 102 |
| Oil filling – gearbox gear oil EP 90 ⁺ | | 1,0 lit | 2,5 lit / 3,0 lit |
| Oil reservoir for mechanical seal - hydraulic oil HLP 22 conforming DIN 51524 Part2 ISO VG 22 | | 0,4 lit | |
| Oil filling for self primer – hydraulic oil HLP 22 conforming DIN 51524 Part2 ISO VG 22 | | 0,2 lit | |

GEAR OIL: conforming DIN 51517 Part3, ISO 12925-1 Type CKC, AGMA 9005-D94EP-5EP; ISO Viscosity Grade: 220

High quality **HYDRAULIC OIL**, conforming DIN 51524 Part2, ISO Viscosity Grade: 22

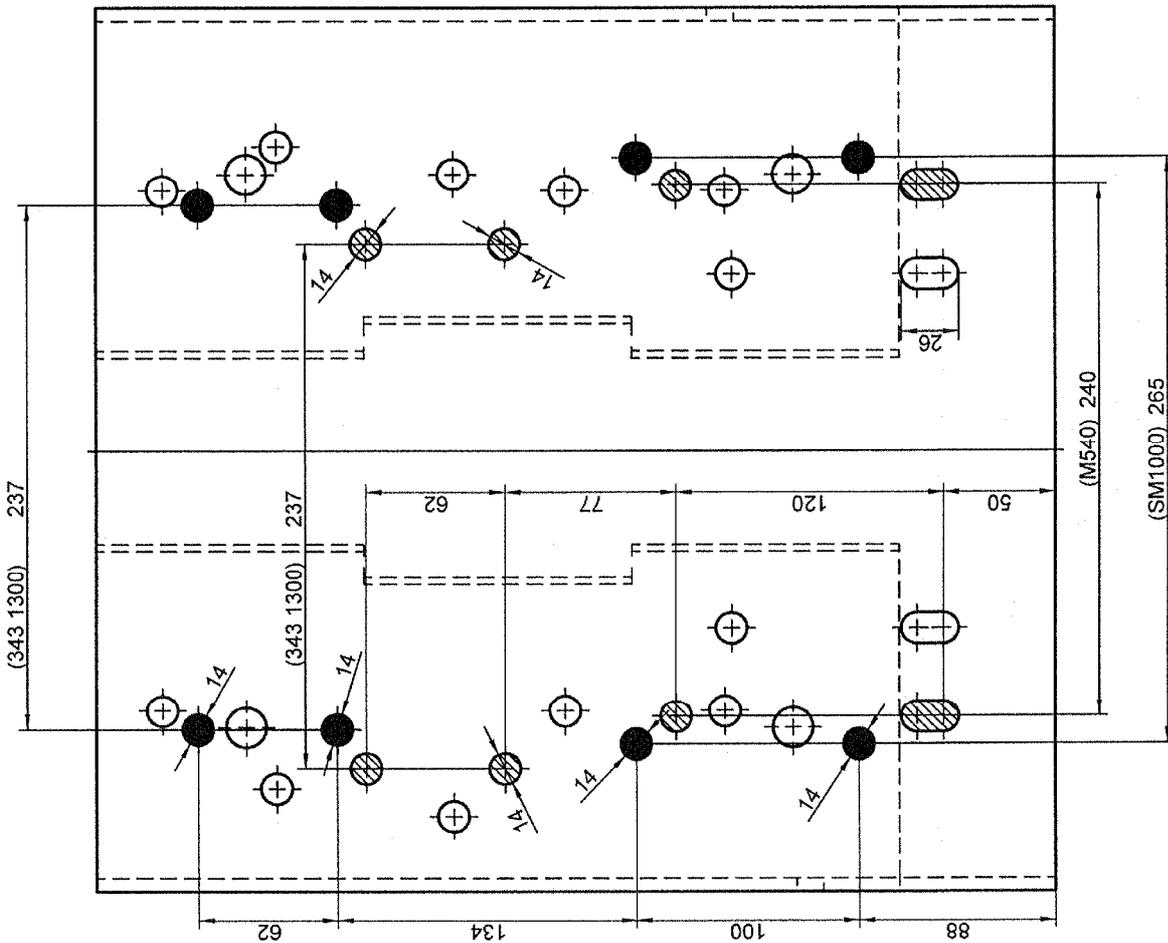
9 FAULT DESCRIPTION

| Fault | Cause | Remedy |
|--|---|--|
| Water level drops during filling | Foreign object blocked between suction pipe and the foot valve. | Open and close the flap several times. |
| | Rubber on foot valve damaged. | Replace rubber. |
| The pump does not deliver | Suction head too high. Leak or blockage in the suction line. | Decrease suction head. Repair defective parts or remove blockage. |
| | Too much solids. | Add water. |
| | Wrong direction of rotation. Seal damage. | Reverse direction of rotation. Replace the seal. |
| Discharge decreases. | Too much counter-pressure Suction line blocked. Impeller blocked. | Remove foreign object. Clean suction line. Clean impeller. |
| Priming procedure with self primer is interrupted. | Ball has got caught. | Open the coupling and close it again. |
| | Leaking joints or hoses. Defective mechanical seal. | Replace couplings or hoses. Replace mechanical seal. |

Assembly drawing for

● Gear pump SM1000
c/w self primer

◐ Gear pump SM540
c/w self primer



Werkstückkanten nach DIN 6784 1:1

Diese Zeichnung ist unser geistiges Eigentum. Sie darf ohne unser Einverständnis weder kopiert noch Dritten Personen ausgeteilt, oder anderweitig missbräuchlich verwendet werden.

This drawing is our intellectual property and must not, without our permission, give away to third parties or misused otherwise.

| | | | | | |
|-------------------------|---------------|---|--------|-------------|-------|
| Freimaßtoleranz | | Oberfläche: | | Material: | |
| nach DIN 7168 | nach DIN 8570 | Halbzeug: | | | |
| fein | A | Werkstoff: | | | |
| mittel | B | Artikel-Nr.: | | | |
| grob | C | Reihen-Nr.: | | | |
| sehr grob | D | | | | |
| Datum | | Benennung: | | Masse: | |
| Gez. | 17.03.00 | Montageplan für Getriebepumpen mit Selbstsaugeinrichtung | | Paßmaß | Abmaß |
| Gepr. | | Type: Pumpenwagen | | | |
| DXF | | Zeichnungs-Nr.: | | | |
| Röhren- u. Pumpenwerk | | Ers. für: | | Ers. durch: | |
| BAUER | | 343 9939.4 | | | |
| Ges.m.b.H. | | | | | |
| 8570 Voitsberg, Austria | | | | | |
| Zust. | Austausch | 17.03.00 | Zeitf. | | |
| Änderung | | | | | |

10 CONFORMITY CERTIFICATE

Conformity Certificate

according to the EC Directive for Machines 98/37/EC, Annex II A

We,

Röhren- und Pumpenwerk BAUER Gesellschaft m.b.H.
Kowaldstraße 2, A - 8570 Voitsberg - Austria
Tel. +43 3142 200 - 0, Telefax: +43 3142 200 -320 /-340

herewith declare that in respect of its conception and construction and in the types and styles marketed by our company, the machine mentioned below fully complies with the relevant fundamental provisions for safety and health as stipulated in the EC directives.

Any modification of this machine without our prior express consent render this certificate invalid.

Designation of the machine: **BAUER gear pump**

Basic models: **MAGNUM SM 540**
 SM 1000 / SM 2000
 each without and with self primer

This range of machines has been designed and built in compliance with the standard:

EN 809

including also the normative references to EN 292-1 - 1991, EN 292-2 – 1991, EN 294 - 1992 and EN 349.



Johann Langmann
management/research/technical design

Voitsberg, 01. 07. 2002