

Operating and Maintenance Instructions

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Screw Pumps

**Retain
for future
use!**

Series SNTE...ER..U / SMTE...ER..U

Order No.:

Pump Ident. No.:

Machine No.:

Pump Type:

Operating data, dimensions and other additional information can be found in the order-specific part of the documentation.



These Operating and Maintenance Instructions contain information from the pump manufacturer. They may need to be supplemented by instructions of the operator company for its personnel. These instructions do not take account of specific information relating to operation and maintenance of the process plant into which the pump is integrated. Such information can only be given by the persons responsible for construction and planning of the plant (plant manufacturer).

Such specific instructions relating to operation and maintenance of the process plant into which the pump is integrated have priority over the instructions of the pump manufacturer. The plant manufacturer must on principle observe the limits of use!

Refer to the operating instructions of the plant manufacturer!

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Important note:

This operating manual is to be supplemented by the order-related informations.

1 General

1.1 Pump designation

The exact designation can be found in the order-specific documents (see data sheet).

1.2 Proper use

Information on proper use of the pumps is provided in the technical data sheet.

The pumped liquid must not contain any abrasive constituents nor corrode the pump materials.

1.3 Performance data

The exact performance data applicable to the pump can be taken from the order data sheet and/or acceptance test report, and are engraved on the name plate.

The pressure data indicated there apply only to approximated static pressure load. In the case of dynamic alternating pressure load, consult the manufacturer.

1.4 Warranty

Our warranty for shortcomings in the supply is laid down in our delivery conditions. No liability will be undertaken for damages caused by non-compliance with the operating instructions and service conditions. If at any later date the operating conditions change (e.g. different fluid conveyed, speed, viscosity, temperature or supply conditions), it must be checked by us from case to case and confirmed, if necessary, that the pump is suited for those purposes. Where no special agreements were made, pumps supplied by us may, during the warranty period, only be opened or varied by us or our authorized contract service workshops; otherwise our liability for any defects will cease.

1.5 Testing

Prior to leaving our factory, all pumps are subjected to a thorough test run and performance test on the test stand. Only properly operating pumps, achieving the performance assured by us, leave the factory.

Thus, compliance with the following operating instructions ensures fault-free operation and full delivery.

1.6 Availability

As a matter of principle, we recommend stocking replacement pumps and withdrawable units (hydraulic action system) where the supplied pumps are a decisive factor in maintaining a production or delivery process. In this way downtimes can be avoided, or reduced to a minimum.

2 Safety

These operating instructions contain basic safety instructions for installation, operation and maintenance. It is therefore essential that they are read by fitters and all specialist staff and customer personnel prior to installation and start-up. They must always be kept at hand at the place of installation.

The special safety instructions contained in the other chapters must be observed in addition to the general safety instructions in this chapter.

2.1 Identification of safety instructions in the operating manual

The safety instructions contained in these operating instructions which represent a danger to personnel if not complied with are specially marked by the general danger symbol:



Warning symbol
as per DIN 4844–W9

Warning of danger from electric voltage is indicated as follows:



Warning symbol
as per DIN 4844–W8.

Instructions which are essential to avoid endangering the machine and its operation are marked by the word

ATTENTION

Instructions affixed directly to the machine such as

- Directional markers
- Signs for fluid connections

must always be observed and maintained in fully legible condition at all times.

2.2 Personnel qualification and training

The operating, maintenance, inspection and mounting personnel must be appropriately qualified for the duties assigned to them. The scope of their responsibilities, competency and supervisory duties must be closely controlled by the customer. If the personnel do not have the required knowledge, they must be trained and instructed. If required, this may be provided by the manufacturer/supplier on behalf of the customer. The customer must additionally ensure that personnel fully understand the content of the operating instructions.

2.3 Dangers in the event of non-compliance with safety instructions

Failure to comply with the safety instructions may result in danger to persons, and place the environment and the machine at risk. Non-compliance with the safety instructions will lead to the loss of any claims for damages.

Non-compliance may result in the following dangers:

- Failure of important functions of the plant
- Failure of specified methods for maintenance and servicing
- Danger to persons resulting from electrical, mechanical and chemical effects
- Danger to the environment resulting from leakage of hazardous substances

2.4 Responsible working practices

The safety instructions contained in these operating instructions, current national accident prevention regulations, as well as internal working, operating and safety rules of the customer, must be observed.

2.5 Safety instructions for the user/operator

- Hot or cold machine parts representing a danger must be protected against accidental contact on site.
- Protection against accidental contact for moving parts (such as the coupling) must not be removed while the machine is in operation.
- When operating pump aggregates in a dust-laden environment (e.g. milling, chipboard manufacture, bakeries), the surfaces of the pumps and motors must be cleaned at regular intervals, depending on local conditions, in order to maintain the cooling effect and eliminate the possibility of spontaneous combustion. Please also see explosion protection regulations (ZH 1/10).
- Leakage (e.g. from the shaft seal) of hazardous substances being handled, such as explosive, toxic or hot materials, must be discharged in such a way that no danger to persons or the environment is created. Legal regulations must be observed.
- Dangers from electrical energy must be eliminated. For details in this regard, please refer to VDE and local power company regulations.

2.6 Safety instructions for maintenance, inspection and installation

The operating company must ensure that all maintenance, inspection and installation tasks are performed by authorized and qualified specialist personnel who have thoroughly studied the operating instructions.

Work on the machine is only to be carried out when the machine is at a standstill. The procedure for shutting down the machine described in the operating instructions must always be followed.

Pumps or aggregates handling fluids which are detrimental to health must be decontaminated. All safety and protective devices must immediately be refitted and made operational on completion of the work.

The instructions under Section 6.1, "Preparation for start-up", must be observed before restarting.

2.7 Unauthorized conversion and production of replacement parts

Conversion or modification of the machines is only permissible after consultation with the manufacturer. Original replacement parts and accessories approved by the manufacturer are intrinsic to safe operation. If other parts are used the manufacturer cannot be held liable for the consequences.

2.8 Unacceptable modes of operation

The operational safety of the machine supplied is only ensured when it is used in accordance with *Section 1* of the operating instructions. The limit values given on the data sheet must not be exceeded under any circumstances.

3 Transportation and Intermediate Storage**3.1 Packaging**

Attention must be paid to the figurative markings on the packaging.

The suction and pressure side and all auxiliary connections must always be closed during transportation and storage.

ATTENTION The coverings must only be removed immediately before connecting the pipeline.

3.2 Transportation

The pump or pump aggregate is to be safely transported to the place of installation, if required by means of lifting gear.



The regulations for lifting loads in accordance with VBG 9a must be observed. Crane and sling equipment must be adequately dimensioned. Sling equipment must not be secured to the lifting eyes of the motor, except as additional protection against overturning in the event of nose-heaviness.

**Transportation to and at the installation site**

Make sure that the unit is transported safely and in a stable position. Overturning due to nose-heaviness must be prevented.

Transport damage

ATTENTION Check the pump for damage on receipt. Any damage detected must be notified immediately.

3.3 Preservation and storage of the screw pumps

3.3.1 Preservation

In the case of storage or prolonged standstill, the pumps must be protected against corrosion. In those cases, an outside and inside preservation is to be provided. The durability of the protection against corrosion, which is limited in time, depends on the composition of the preservative to be applied and the storage conditions.

ATTENTION Under normal circumstances the pumps have no special preservative.

At an additional charge we can, however, supply pumps and replacement parts ex factory with a preservative adequate to the planned storage period.

We will be pleased to specify suitable preservatives for you on request.

3.3.1.1 Outside preservation

The outside preservative should be applied by painting or spraying with a spray gun.

Points of preservation:

All bright and unvarnished parts (e.g. shaft ends, couplings, flange facings, valve and manometer connections).

3.3.1.2 Inside preservation

The preservative is to be applied by filling the pump. For these purposes, the suction side of the pump must first be closed with a dummy flange. During filling, the pressure flange must be on a higher level than the suction flange. During the filling process, the shaft must be slowly cranked against the direction of rotation. Filling must be continued until the preservative reaches the sealing strip of the delivery flange, bubble-free. Then the outlet side is to be closed with a dummy flange.

Note: Not required for pumps made of stainless materials.

Points of preservation:

All bright parts inside the pump (e.g. pump casing inside, screw spindles, ball bearings, pressure-relief valves).

3.3.1.3 Monitoring of preservation

In the event of prolonged storage, the preservation of the pump must be checked by the customer at regular intervals.

Every six months the pump level must be checked; if necessary, preservative must be topped up to the sealing strip on the pressure flange.

At the same time, the packing must be checked for destruction, and repaired if necessary.

Note: Liability for damages caused by improper preservation cannot be assumed by us.

3.3.1.4 Depreservation



Prior to setting the pump in motion, the preservative applied must be removed.

Environmentally compatible disposal must be ensured.

The preservative applied for inside preservation can normally be removed by flushing the pump with the fluid to be conveyed.

Alternative, suitable solvents may be applied for removing the inside and outside preservation. Appropriate solvents are for example: petroleum, benzene, Diesel fuel, spirit, alkalis (industrial cleaners) or any other wax solvents. Steam jet cleaning devices with appropriate admixtures can also be used (allow wax solvent to act beforehand).

ATTENTION Prior to start-up after prolonged storage, all elastomers (O-rings, shaft seals) must be checked for their elasticity of shape. Embrittled elastomers must be exchanged. Elastomers of ethylene-propylene rubber (EPDM) must always be replaced. The pump must be filled with fluid to prevent seizing of the components. A pressure-relief valve attached or fitted in the pipeline must be checked for passage.

Note: If on the plant side, the pipelines, (oil) tanks or other parts are wetted with paraffin-containing preservative, the entire plant must be depreserved as paraffin is detrimental to the air separating capability of oil. This may result in unsteady operation of the pump and loud noise.

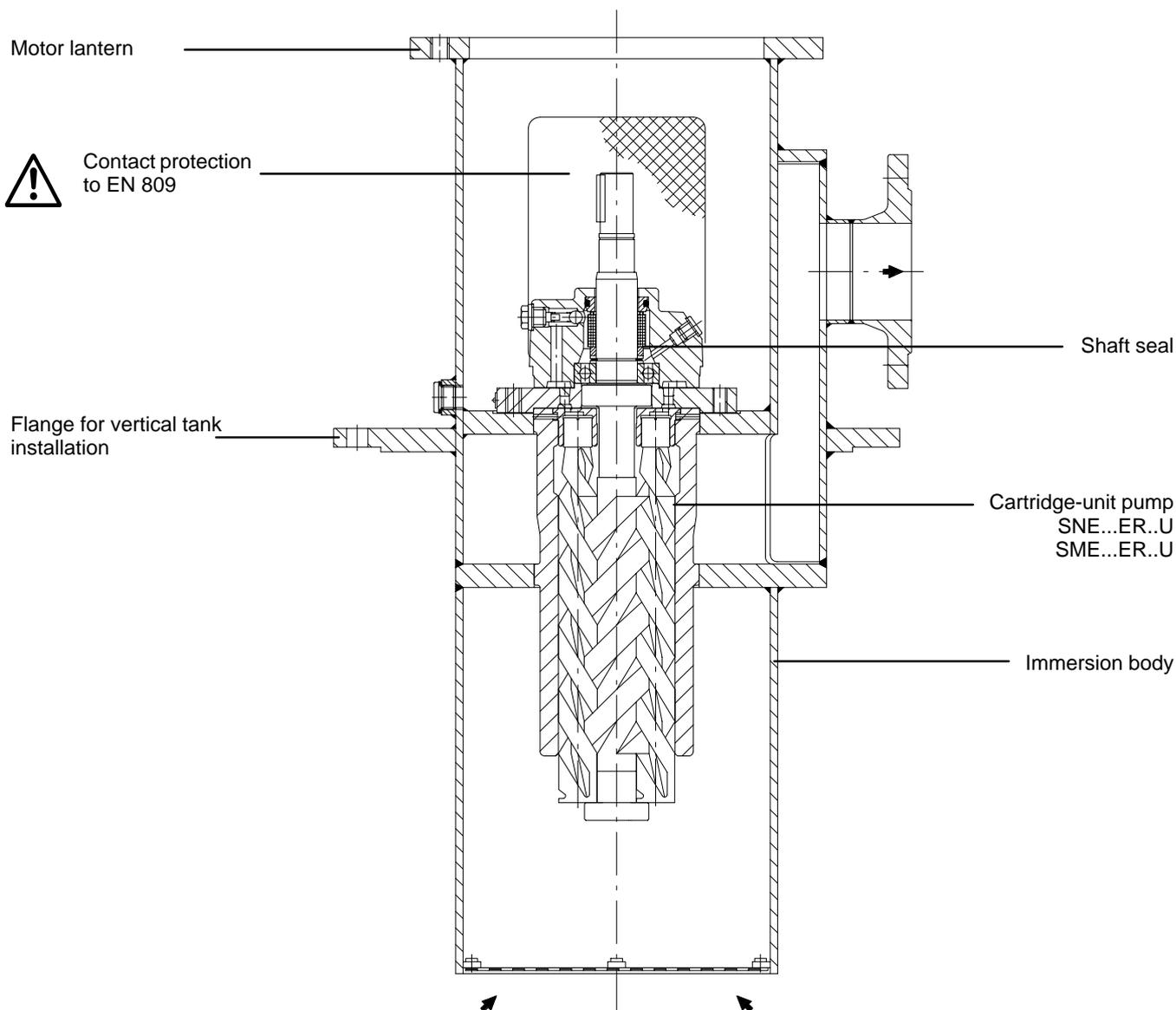
3.3.2 Storage

During storage of the pump, the suction and outlet branches and all other supply and discharge branches must always be closed with dummy flanges or dummy plugs.

Storage should be in a dry, dust-free room. During storage, the pump should be cranked at least once a month. During this process, parts such as the shaft and bearings should change their position.

4 Description / Principle design of the pump

The pictorial presentation may not correspond with the pump supplied.
The actual design will be stated in the specific order documents.



Pressure relief valve

For safety reasons, screw pumps must generally be equipped with a pressure relief valve. The pumps don't have incorporated pressure-relief valves.



Earthing connection to EN 809 must be attached by the customer



Pumps that are supplied without a pressure relief valve must be provided with a suitable safety valve by the customer. The safety valve must be fitted in the discharge pipeline between the pump and the first shut-off device.

5 Installation/Mounting

5.1 Installation

For installation methods and locations, please see installation drawing.



Other methods of installation are not permissible without prior consultation with the manufacturer.

5.1.1 Place of installation

Temperature: min. -20 °C
 max. +40 °C

relative air humidity:
 permanent max. 85 %
 temporary max. 100 %

Installation height: max. 1000 m above NN

For data differing from this, please consult the manufacturer.

ATTENTION Intensive vibrations in the vicinity of the pump unit can lead to bearing damage and must therefore be avoided.

5.1.2 Protective devices



In order to prevent injuries due to burns, at pumping liquid temperatures higher than 60°C protective devices in accordance with EN 809 must be provided **on site**.

5.1.3 Fixing the pump aggregate

The pump aggregate is attached directly to the tank via the covering plate, and secured with machine bolts.

ATTENTION The prescribed tightening torque must be observed.

ATTENTION The covering plate must be constructed in such a way that it can take the weight of the pump unit and all operating forces that occur.

Precise details on the shape and dimension of the fixing are provided in the installation drawing.

5.1.4 Checking the alignment

After aligning and tightening the screws, it must be possible to turn the pump and drive by hand, without any strain.

Note: The pump unit should not be welded to the covering plate for technical installation reasons.

5.2 Assembly of pump and drive motor

If the aggregate is only assembled at the place of use, the coupling is assembled as follows:

1. Coat the pump and motor shaft ends with a fine film of molybdenum disulfide (e.g. Molykote) and insert keys.

2. Push on the coupling halves on the pump and motor side with the aid of a pusher device until the shaft end is flush to the coupling hub.

If no puller is available, heating the coupling halves to approx. 100°C (without rubber buffer) facilitates pushing.

ATTENTION Impacts to the components of the pump or motor must be avoided.

3. Tighten the grub screw on both coupling hubs.

4. When assembling the pump and motor, ensure that the gap between the coupling halves is between 2 and 6 mm, depending on design size (see our dimension sheets).

5. The coupling does not need to be re-aligned.

6. Mount the contact protection.



According to accident prevention regulations, the pump must only be operated with a protection against accidental contact.

5.3 Space required for maintenance and repair

ATTENTION The pump must be accessible from all sides in order to be able to carry out necessary visual inspections.

Adequate space must be provided for maintenance and repair work. It must also be ensured that all pipelines can be attached and removed without hindrance.

5.4 Laying the pipelines

5.4.1 Nominal widths

If possible, the nominal widths of the suction and pressure pipelines should be rated so that the rate of flow does not exceed a maximum of 1 m/s in the suction pipeline and 3 m/s in the pressure pipeline. If possible, suction pipelines laid "uphill" are to be avoided.

5.4.2 Change of cross-sections and directions

Sudden changes of cross-sections and directions, as well as hairpin bends, are to be avoided.

5.4.3 Supports and flange connections

The pipelines must be connected to the pump, stress-free. They must be supported close to the pump and must allow easy screwing-on to avoid twisting. When the connections are loosened the pipeline must neither be slanted nor springing, nor must it be under pressure.

Any thermal stresses occurring on the pipelines must be kept away from the pump by suitable means, e.g. installing compensators.

5.4.4 Cleaning pipelines prior to attachment

Prior to assembly, all pipeline parts and valves must be thoroughly cleaned; especially in the case of welded pipelines, burrs and welding beads must be removed. Flange gaskets must not protrude inwards. Blanking flanges, plugs, protective film and/or protective paint on flanges and seals must be removed completely. Water residues, still in the pipeline network from pressing-out or steeping for example, must be removed.

Delivery of water destroys the pump. The pump relies on the fluid being conveyed for its lubrication.

5.4.4.1 Inlet/suction conditions (NPSH)

To ensure fault-free continuous operation, the inlet and suction conditions of the plant must be appropriately adjusted to the pump demand (NPSHreq.)

The service condition is fulfilled when the plant NPSH value (NPSHavail.) is above the pump NPSH (NPSHreq.). The NPSHreq. is given in the characteristic sheets of the respective pumps

ATTENTION When pumping air-laden or volatile liquids, particular attention must be paid to the NPSH requirements of the plant.

5.4.5 Stop valves

Stop valves are to be installed in the suction and pressure pipelines close to the pump.

5.4.6 Pressure-relief valve

See Section 4.1 ...

5.4.7 Check valve

It is recommended to install a check valve between the pressure connection of the pump and the stop valve in order to prevent the pump from running dry when it is at a standstill and the pressure stop valve is open.

5.4.8 Vent valve

A vent valve must be provided at the highest point in the pressure pipeline.

5.4.9 Fluid tank

The tank must be designed so that air bubbles formed in the plant are separated from the fluid and not drawn in again by the pump.

5.4.10 Filtering

To protect the pump against coarse dirt contamination, we recommend as a matter of principle installing a filter in the suction pipeline, mesh width 0.6 mm.

Note: The service life of the pump is decisively influenced by the degree of dirt contamination of the fluid being conveyed, that is, by the number, size and hardness of the abrasive components.

5.4.11 Auxiliary pipelines (if present)

All auxiliary pipelines must be connected in accordance with the installation drawing, stress-free and sealed.

5.5 Safety and control devices

5.5.1 Manometers

Suitable pressure gauges are to be installed in the inlet and pressure pipelines, and in the pressurized auxiliary pipelines.

5.5.2 Safety device in the pressure pipeline



For pumps delivered without a pressure-relief valve, an overload protection must be provided in the control, or a pressure-relief valve (return valve) in the pressure pipeline (see separate Operating Instructions).

5.6 Electrical connections



The power supply cables of the coupled drive motor must be connected by a trained electrician, according to the motor manufacturer's circuit diagram. The applicable VDE regulations and local power company rules must be observed.

Danger from electrical energy must be eliminated.

6 Start-up/Shutdown

6.1 Preparation for start-up

6.1.1 Filling the pump with fluid

ATTENTION Prior to initial operation, the screw pump must be filled with fluid and bled. This at the same time provides the spindles with the sealing required for suction.

The pump must not run dry.

ATTENTION Before filling, the operator must ensure careful and thorough rinsing of the pump if the fluid to be conveyed is not chemically compatible with the test medium (see performance test report).

The fluid is to be filled via the pressure pipeline until the fluid emerges free from air.

In the case of immersion pump aggregates the filling level must ensure adequate covering of the inlet rim before and during operation.

For minimum and maximum filling levels see technical specification.



During bleeding of the pump and the plant, hazardous or environmentally harmful fluid and gas emerging must be safely collected and discharged.

6.1.2 Control of drive motor direction of rotation

The direction of rotation of the motor must match the direction of rotation arrow on the pump. The motor can be briefly switched on with the suction and pressure valves open to check the direction of rotation. If the direction of rotation is wrong there is no pump suction. This damages the pump. The direction of rotation of the three-phase motor can be reversed by swapping any two phases.

ATTENTION If the direction of rotation is to be checked before the pump is filled with fluid, the drive motor must be disconnected from the pump. The pump must not run dry.

6.1.3 Switching on any auxiliary devices

Before switching on the pump, any additional devices (e.g. heating, cooling, quench system, pressure relief system) must be set in operation and must have reached the necessary flow/temperature and pressure values.

Note: Ensure that flow/temperature and pressure values are in accordance with the order data sheet or manufacturer's operating instructions!

6.2 Start-up

6.2.1 Starting

1. Prior to starting, the stop valves in the suction and pressure pipelines must be completely opened.

2. Where the pump is fitted with a pressure-relief valve, it is set on our test panel to respond 10% above the operating pressure. The opening pressure can be altered within narrow limits by means of an adjusting screw. The installation of a pressure-relief valve is always required when an impermissible pressure rise is possible, due to a stop device or throttle point in the pressure pipeline for example. If the pressure-relief valve has a hand-wheel regulation, the pump can be started at zero pressure. For this, the pressure-relief valve must be completely opened using the hand-wheel. The starting torque of the motor is thereby reduced.

ATTENTION When starting and stopping the pump under pressure, make sure that the speed- and viscosity-dependent pressure load is not exceeded.

If this is not ensured, the pump must be started and stopped at zero pressure. This also applies to pumps with speed-controlled drive motors.

3. During starting, a vent valve installed on the outlet side of the plant must be opened until the air has escaped from the suction side of the pump. As soon as fluid emerges the vent valve can be closed. The pump is self-priming and is automatically vented without counter-pressure.

4. The fluid level in the tank must be checked. It must be ensured that, when the plant is running, the fluid level in the tank does not fall below the minimum limit. Top up fluid as necessary.

6.2.2 Drive

Switch on the motor.

Pay attention to product-specific characteristics. Refer to the operating instructions of the drive motor manufacturer.

6.2.3 Checking the delivery values

When the motor has reached its operating speed, the inlet pressure and outlet pressure of the pump must be checked using manometers.

For pumps fitted with a hand-regulated pressure-relief valve, the hand-wheel must be closed slowly beforehand, until the pump outlet pressure is reached. The motor must not be overloaded. The current consumption can be checked with an ammeter. In this connection, the temperature and viscosity of the fluid must also be checked. The readings must be checked against the layout or acceptance test report.

6.3 Shutdown

6.3.1 Stopping and interrupting operation

1. Switch off the motor. Make sure the pump runs down smoothly and evenly.
2. If a check valve is installed in the pressure pipeline, the stop valve can remain open. If no check valve is fitted, the stop valve must be closed.
3. Stop any additional devices that are present (e.g. heating, cooling, quench system, etc.).

6.3.2 Measures in case of prolonged interruption

If a prolonged interruption is intended, the pump must be drained thoroughly via the connections on the pump casing. We recommend removing cartridge-unit pumps and immersion pumps from the tank or the plant.



Safe draining and environmentally compatible disposal of the fluid must be ensured.

Preservative should then be applied to the pump (see Section 3.3).

7 Maintenance/Repair

7.1 Maintenance

- The instructions in Section 2, *Safety*, must be observed in maintenance and repair work.
- Regular monitoring and maintenance of the pump and drive motor increases their service life.

The following instructions are generally applicable.

7.1.1 General monitoring

1. The pump must not run dry.
2. The drive motor must not be overloaded.
3. The suction and pressure pipelines must be checked for leaks. Air must be prevented from entering the delivery system.
4. There must be no serious leakage from the shaft seal.
5. Pressure and temperature monitors must be observed.
6. The filling level in the tank must be regularly checked.

7.1.2 Maintenance of components

7.1.2.1 Bearing

The bearing of the driving spindle is maintenance-free. The groove ball bearing is designed for a service life of approx. 24,000 hours under normal operating conditions.

The actual service life may be reduced due to intermittent operation, high temperature, low viscosity, poorly lubricating fluids and the like. We therefore recommend checking the running noises and temperature in the bearing area at regular intervals.

If scraping or rattling noises are heard compared to the normal humming, or if excessive temperature rises are detected, this indicates impending bearing damage, and the ball bearing should be replaced as soon as possible.

7.1.2.2 Shaft seal

The shaft is either sealed by the stuffing box, shaft seal rings or mechanical seal.

• Stuffing box

Increased leakages, if any, at the stuffing box during the first operating hours normally disappear automatically during the running-in time. If necessary, slightly tighten hexagon nuts at the gland.

See to it that the stuffing box must be slightly dripping. Thus, the frictional heat generated at the sealing surface is dissipated.

If leakage losses increase excessively and if even repeated slight tightening of the hexagon nuts does not result in any leakage reduction, the packing rings have lost their elasticity of shape and must be replaced.

• Shaft seal rings

Two or three shaft seal rings may be installed. The shaft seal rings must be checked for a potential leakage. Leaky shaft seal rings must be replaced.

Note: If new shaft seal rings are installed, the sealing lips must be coated with rolling bearing grease and the space between the shaft seal rings filled with rolling bearing grease.

• Mechanical seal

A mechanical seal is installed, the functioning of which complies with the required service characteristics. Minimal dripping of non-volatile media resulting from the functioning of the components is to be expected. In the event of heavy leakage due to wear, the mechanical seal should be replaced.

ATTENTION Because the mechanical seal must not run dry, the pump must only be started up when filled and bled.

• Additional devices

Any additional device at the shaft seal (heating system, cooling system, quencher, pressure relief system) must be monitored.

7.1.2.3 Pressure-relief valve

Pressure-relief valves must be checked from time to time, in particular after prolonged downtimes, for passage and functioning. Leaking pressure-relief valves may cause damage to the pump. Damaged parts should be replaced or repaired as necessary.

Note: Operating instructions for pressure-relief valves should be ordered separately.

7.1.2.4 Coupling

The condition of the flexible elements in the coupling should be checked after initial start-up and at regular intervals.

Note: Worn flexible elements must be replaced.

7.1.2.5 Drive

Refer to the operating instructions of the motor manufacturer.

7.2 Repair

General



The system operator is responsible for ensuring that instruction in safety is provided. The personnel must be made aware of all hazards that can arise in connection with the pumped liquid or the plant.

Mounting and repair work

Trained Service fitters are available on request to carry out mounting and repair work.



For all repairs, it must be ensured that the pump is depressurised, completely drained and cool. The motor must be protected against unintended switching on.

We must refuse acceptance of repair work on pumps filled with fluid, for the protection of our staff and for environmental reasons. The expenditures for disposal with respect to the environment are to be carry by the customer/operating company.

Hazardous substances



Where repairs are to be carried out on pumps which have been operated with hazardous substances ① and/or environmentally harmful media, the customer/operator must inform its own personnel on site, or our personnel where repairs are returned to our factory or a service workshop, without being specifically requested to do so.

Together with the request for a Service fitter a verification of delivery material, for example in the form of a DIN safety data sheet, must be submitted to us.

Alternatively, you can request a certificate of safety (form no. 448/191) from our Service department, filling it out truthfully, correctly and in full. Send the completed form to the center commissioned with carrying out the repair, or hand it to our Service fitter.

① Hazardous substances are:

- Toxic substances
- Health–endangering substances
- Corrosive substances
- Irritants
- Explosive substances
- Fire–inducing substances
- Highly flammable, easily flammable and normally flammable substances
- Carcinogenic substances
- Substances impairing fertility
- Genetically distorting substances
- Substances in other ways hazardous to humans



Pumps or units which pump hazardous substances or substances that are dangerous to the environment must be completely decontaminated.

7.2.1 Dismounting the screw pump

Before dismounting, the following work must be carried out:



- The power supply cable must be disconnected from the motor by an authorized electrician. Electrical danger must be eliminated! The motor must be secured against being switched on.

- Close all stop devices in the suction and pressure pipelines.

- Remove supply/suction and pressure pipelines.

- Allow the pump and motor to cool to ambient temperature.

- Remove the motor from the motor bracket.

- Remove immersion pump aggregates from the tank.
Note: Use suitable lifting gear.

- Drain the fluid in flowable condition from the pump.
Note: Use a collecting tank.



- Hazardous substances and/or environmentally harmful media must be drained off and collected such that no danger to life and limb is created. Environmentally compatible disposal must be ensured.

- The pump must be depressurized and drained.



The pump must be dismantled by a qualified technician using the pertaining sectional drawing.

To prevent damage, it is especially important to ensure that the components are dismantled concentrically and that they are not tilted.

Dismounting instructions:

- The fitting position of all components must be accurately marked before dismounting.

7.2.2 Mounting the screw pump

ATTENTION Before remounting check all parts for wear and, as necessary, replace with **original replacement parts**.

Clean all parts before mounting. Always fit new gaskets.



The pump must be mounted by a qualified technician using the pertaining sectional drawing.

To prevent damage, it is especially important to ensure that the components are mounted concentrically and that they are not tilted.

Mounting instructions:

- The markings applied when dismounting must be observed. The components must be put back in their original fitting position.
- After tightening the screws it must be possible to turn the pump by hand without straining points.

When the screw pump has been mounted the following work must be carried out:

- Install pump aggregate in the tank.
- Attach pressure pipeline.
- Mount motor.



- The power supply cable must be connected to the motor by an authorized electrician. Electrical danger must be eliminated! Pay attention to direction of rotation.

- If necessary, fill tank with fluid.

- Fill pump with fluid.

Start up pump as per instructions in Section 6.

7.3 Replacement parts/spare parts

The parts marked in the parts list can be provided as replacement/spare parts.

The drive spindle (12) and idler spindles (13) are available only as a complete spindle set.

However, for operational safety reasons, we recommend you always stock a complete cartridge–unit or standby pump.

The advantage is that in the event of a fault or damage the standby unit can replace the non–functioning unit quickly and without great effort.

When ordering spare and replacement parts, besides the **part number, denomination** and **quantity**, the following should also be quoted:

**Pump abbreviation,
Pump number,
Year of construction.**

This information is engraved on the name plate of the pump.

8 Operating Faults, Causes and Remedial Action

8.1 Faults with reference number for cause and remedial action

The table below is intended as a guide to identifying faults and their possible causes. Faults relating to the pressure-relief valve are listed separately.

If faults occur which are not listed here, or which cannot be traced back to the listed causes, we recommend consulting the factory, or one of our branch offices or sales offices.



The pump must be depressurized and drained when faults are being rectified.

Screw pump faults	Reference numbers for cause and remedial action
No pump suction and no delivery	1, 2, 3, 4, 5, 11
Delivery too low	2, 6, 7, 8, 9, 10, 11
Pump operates noisily	4, 5, 6, 7, 8, 10, 11, 12, 13
Irregular delivery	6, 7, 10
Pump gets too warm	6, 7, 11, 14, 16
Pump is seized	14, 15, 16
Motor overload	6, 13, 14, 15, 16
Pressure-relief valve faults	Reference numbers for cause and remedial action
Delivery pressure drops	17
Pressure-relief valve does not open	18
Pressure-relief valve does not close	19
Pressure-relief valve knocks	20

8.2 Causes and remedial action

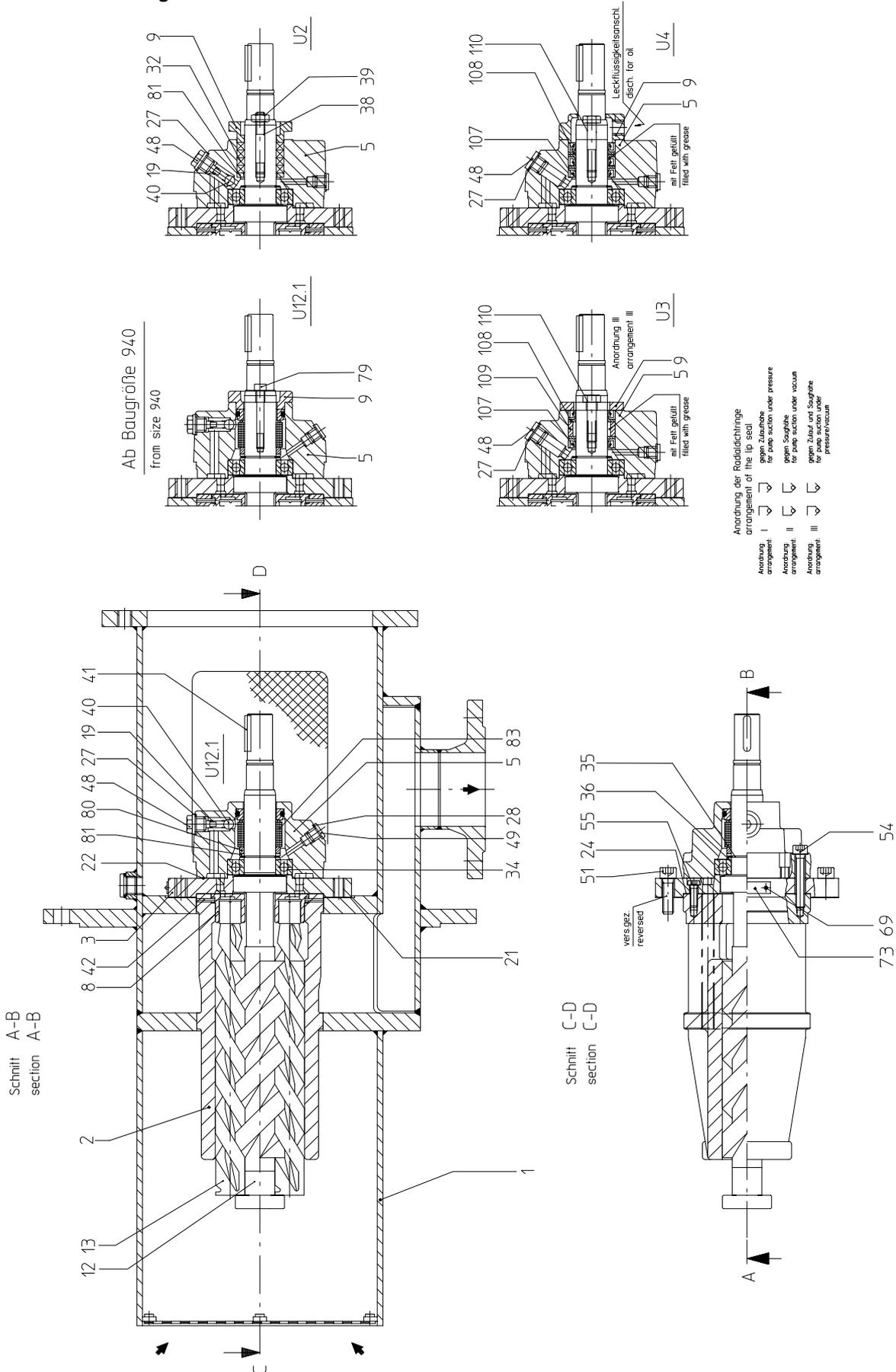
Ref. no.:	Cause	Remedial action
1	Pump not filled with fluid before initial operation.	Fill pump with fluid.
2	Stop valves/sliders not open or only partially open.	Fully open stop valves/sliders during operation.
3	Motor direction of rotation wrong.	The direction of rotation of the motor must match the direction of rotation arrow on the pump. The direction of rotation can be reversed by swapping any two phases.
4	Suction pipeline or shaft seal leaky.	Retighten flange screw connections. Check shaft seal.
5	Air in suction and pressure system.	Open vent valve on pump pressure side until air has escaped. Close valve again.
6	Wrong fluid viscosity.	Check that viscosity matches entries in acceptance test report. In case of zero-pressure delivery of low-viscosity fluids, apply 1 to 2 bar to pump.
7	Pressure-relief valve leaking.	Check pressure-relief valve for passage. If necessary, regrind valve seat and/or exchange valve cone.
8	Geodetic suction head too high.	Check underpressure on suction side using connected pressure/vacuum gauge. Increase fluid level in tank, lower pump.
9	Motor speed too low.	Check speed and current consumption of motor. Check voltage and frequency against motor rating plate.
10	Air separating time in operating tank too short.	Provide better air separation in operating tank. Return lines must emerge below oil level of tank.
11	Fluid level in tank too low.	Fill tank to necessary fluid level.

12	Flow rate in suction and pressure pipelines too high.	Flow rate in suction pipeline must not exceed max. 1 m/s, and in pressure pipeline max. 3 m/s.
13	Motor speed too high.	Check speed and current consumption. Check voltage and frequency against motor rating plate.
14	Delivery pressure too high.	Set specified delivery pressure via pressure-relief valve. Pump outlet pressure must not be exceeded.
15	Foreign bodies in pump.	Dismantle pump, remove foreign bodies and smooth damaged points with oilstone. Check suction filter and strainer.
16	Damaged ball bearing.	Replace ball bearing.
17	Pressure spring fatigued. Valve seat leaking.	Install new pressure spring. Install new valve cone.
18	Pressure spring heavily pre-tensioned. Valve cone stuck in valve housing. a) Due to foreign body or b) Operating temperature of plant substantially higher than quoted on order.	Release pressure spring using adjusting screw, and reset to required pressure. Dismantle pressure-relief valve. Clean internal parts. Consult factory.
19	Pressure spring not pre-tensioned, or insufficiently pre-tensioned. Valve seat leaking.	Turn adjusting screw to right until required operating pressure is reached. Rework or replace valve cone and valve housing.
20	Pressure-relief valve knocking.	Check overpressure with pressure valve closed. Reset valve. Opening pressure 10 % above operating pressure.

9 Associated Documentation (examples of execution)

Note: The precise execution is shown in the order-specific sectional drawing.

9.1 Sectional drawing 653 0007 044



9.2 Order-specific Documentation

These operating instructions are supplemented by the following documents:

	Acceptance of order	No.
	Data sheet	No.
	Installation drawing	No.
	Sectional drawing	No.
	Part list	No.

Subject to technical changes.

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