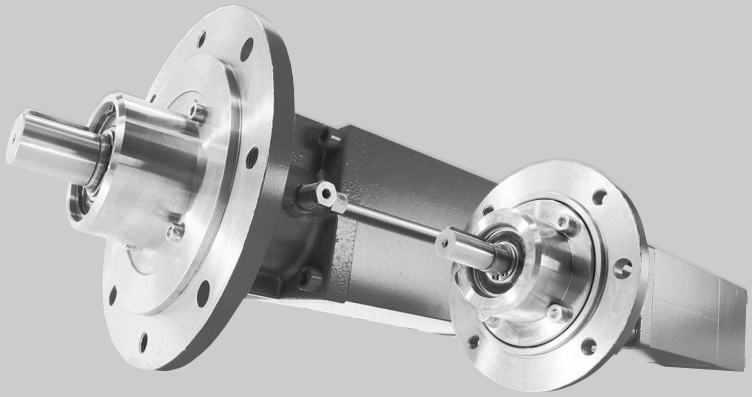
KNOLL
.It works

Installation
instructions and
operation manual



GB

KTS

Screw pump
Type KTS

Contents

Page

1 Description of product and function 5
1.1 Type code structure (example) 5
1.2 Pump versions 5
1.3 Pump structure 6
1.4 Technical data 6
1.5 Important instructions for the screw pump 6
2 Danger and safety instructions 7
2.1 General instructions 7
2.2 Instructions for repair/maintenance work and in the event of faults 7
3 Transport 8
4 Assembly / Installation 8
4.1 Safety requirements 8
4.2 Installing the unit 8
4.3 Connecting the piping system 9
4.4 Electrical connection 10
5 Initial startup 11
5.1 Startup 11
5.2 Shutdown 11
5.3 Instructions for operation 11
6 Maintenance 12
6.1 Removing the coupling 12
6.2 Fitting the coupling 13
7 Faults 13
7.1 Noises in the pipeline 13
7.2 Correcting system faults 14

1 Description of product and method of operation

Normal use

- Delivering fluids that are under counterpressure

Application range

- Screw pumps are suitable for conveying lubricating and some non-lubricating fluids
- Applications include areas where high pressures and constant output are required (e.g. general constructional engineering, tool machine industry, etc.)

Mode of operation

- The interlocking threads on three screw spindles form voids

- The screw spindles are driven and rotate
- The medium moves continuously and gently in the conveying direction
- High rotation speeds achieve considerable output flow rates
- The length of the spindles and the incline of the threads determine the maximum possible supply pressure

1.1 Type code structure (example)

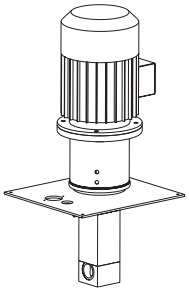
High-pressure pump:

KTS 25 - 50 - T - G

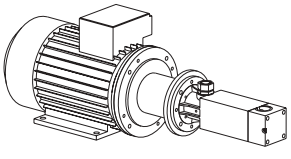
Configuration
Size
Thread pitch (mm)
Version (submerge version or base version)
Slip ring seal

1.2 Pump versions

KTS - Submerge version

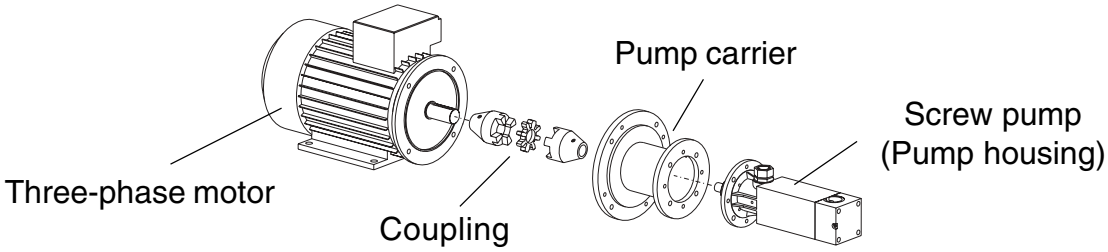


KTS - Base version



KNOLL
.It works

1.3 Pump design



1.4 Technical data

Max. supply pressure		150 bar
Max. temperature of conveyed medium		80 °C
Max. delivery pressure with the slip ring seal under load		8 bar
Kinematic viscosity of the conveyed medium		1-75 mm²/s(cST)
Proportion of concentrated coolants and emulsions		min. 3 %
Max. flow speed:	- intake line	1 m/s
	- pressure line	3 m/s
Conveyed medium (other conveyed media on request)		Cooling lubricants and lubricating oils

The values indicated above should be regarded as maximum values. They depend on various factors such as temperature, conveyed medium, etc. and may not necessarily be reached.

1.5 Important instructions for the screw pump

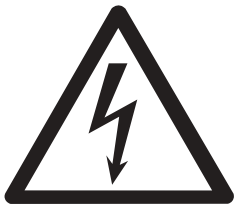
- **Never allow screw pumps to run dry.**
- **Incorrect direction of rotation leads to pump damage.**
- **Sufficient supply of fluid must always be guaranteed.**
- **Floating particles in coolant may damage the screw pump.**
- **If high-pressure pumps are still to be used, a suitable fine-filter system must be installed upstream. If the cause of pump damage is excessive particles and can be proven, the warranty is no longer valid**
- **The size and concentration of a tolerable amount of particles depend on the particle hardness.**

Materials:	**Particle size:**	**Particle concentration:**
Steel / Forgeable aluminium alloys / GG25	< 50 µm	< 200 mg/l
Grey cast iron with hard additives (e.g. CGI)	< 30 µm	< 100 mg/l
Ceramic / aluminium oxide abrasive / carbide / glass	< 10 µm	< 60 mg/l

2 Risks and safety instructions

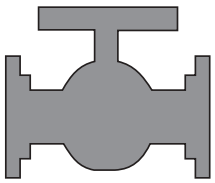
2.1 General instructions

- **Always follow all data and instructions for the enclosed operating manual.**
- **Never override safety devices (e.g. pressure limiting valves).**
- **Always ensure that safety equipment functions properly.**

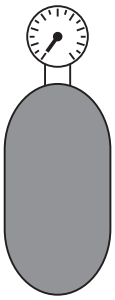


- **Work on the electrical system (motors) must only be carried out by electronics experts.**
- **The relevant statutory regulations and connection specifications of the relevant electrical supply company must be observed.**

2.2 Instructions for repair and maintenance work, and for malfunctions



- **Close the piping valve.**
- **Remove all hazardous materials.**
- **Do not allow coolant to escape into the environment.**



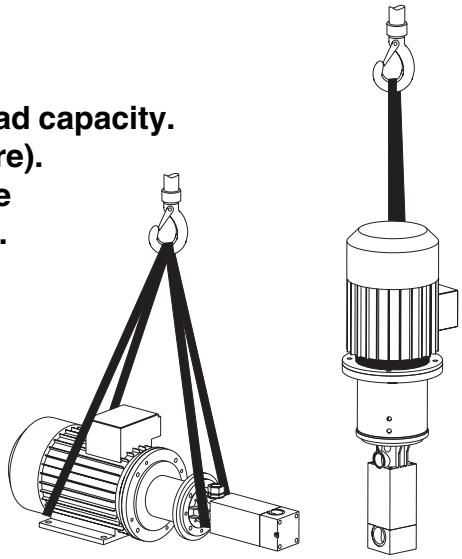
- **Depressurise unit.**

- **Always wear protective clothing and protective gloves when handling hazardous substances.**

KNOLL
.It works

3 Transportation

Risk of injury
- **Do not stand beneath suspended loads.**
- **Ensure that the carrying cable has a sufficient load capacity.**
- **Attach the cable underneath the motor (see Figure).**
- **Make sure that the pump does not slide out of the transport train suspension during transportation.**
- **The illustrations on this page are provided as examples.**



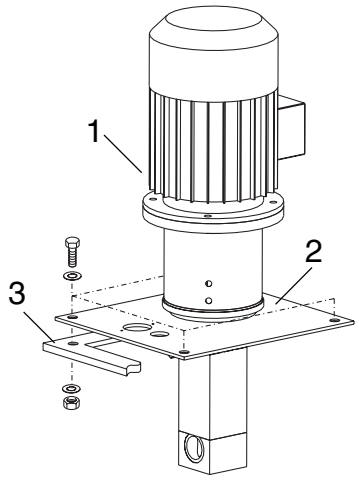
4 Assembly / installation

4.1 Safety requirements

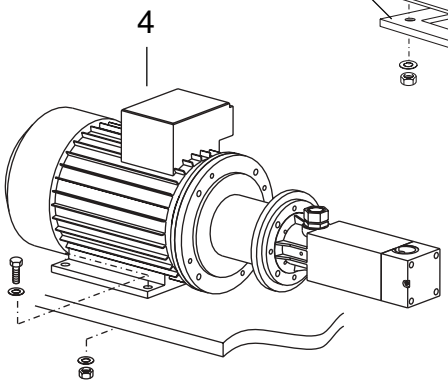
Risk of injury
- **Pump is not intended for use in areas where there is a danger of explosions**
- **Electrical operating equipment which is to be operated in potentially explosive areas must be ATEX-approved and fulfil the relevant protection specifications. These are identified by the symbol for explosion-proof operating equipment.**

4.2 Installing the unit

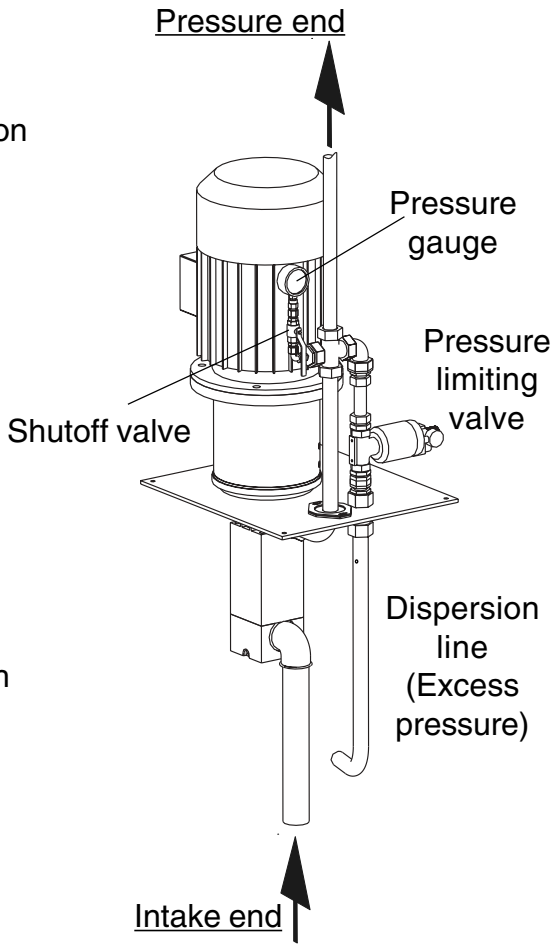
- Any installation location (motor facing downwards not permitted)
- Insert submerge version KTS pump (1) including pump plate (2) into the corresponding aperture (3) on the coolant tank and secure using the mounting screws



- When the delivery line is fitted to base versions of KTS pumps (4) (dry installation), make sure that the pump fills automatically



4.3 Connecting the piping system



- Connect the intake line, pressure line and excess pressure dispersion line as shown in the illustration

☞ ***Back pressure should not build in the pressure limiting valve dispersion line.***

Piping

- Connected pipelines should not exercise any strain on the pump
- Avoid unnecessary changes in direction and changes to the pipeline diameter
- Do not select pipes with a nominal width that is smaller than the pump's nominal pipe width
- Clean all piping elements and fittings, remove any burrs and welding beads
- Flange seals should not protrude inwards

Pressure limiting valves

- Protect screw pumps against excess pressure **(never use without a pressure limiting valve)**
- The opening pressure of additional safety valves must be approx. 10% greater than the operating pressure of the pump
- Check the function of pressure limiting valves after longer shutdown periods, replace any damaged components, if necessary

☞ *Leaking pressure limiting valves may damage the pump.*

Pressure gauge

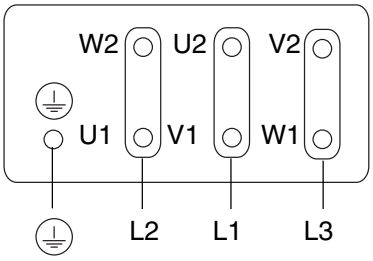
- Briefly open shutoff valve on the pressure gauge to check the supply pressure, then close again. The shutoff valve protects the pressure gauge from surges in pressure. Surges in pressure may damage the pressure gauge.

KNOLL
.It works

4.4 Electrical connection

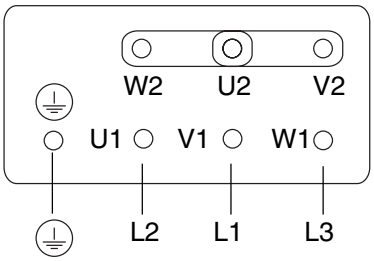
- Work on the electrical system should only be carried out by a qualified electrician.
- Only carry out work when the motor is disconnected from the power supply.

Delta connection
3x230 V or 220-240 V



- Connect the motor to the electricity supply.
- Compare the existing power supply voltage with the specifications on the motor identification plate and select a suitable circuit configuration
- Establish connection via a motor protection switch
- In the case of a star-delta connection, keep the switch-over point of the time relay as short as possible. Long switching times may damage the pump
  Time relay setting: < 3 sec.
- Make sure the rotation direction is correct (see direction arrow on type plate)

Star connection
3x400 V or 380-420 V

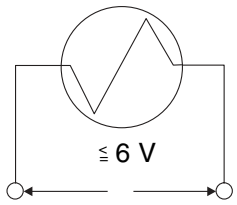


Drive

Three-phase current short-circuit rotor motor

- Type V 18, degree of protection IP 54, grade B insulating material
- 220-240 V(△)/ 380-420 V(Y), 50 Hz, 2900 rpm
- 220-265 V(△)/ 380-460 V(Y), 60 Hz, 3500 rpm

Wiring diagram
PTC resistor



Direction of rotation

Danger of damaging the pump
- Incorrect direction of rotation leads to pump damage.

- The rotation direction of the motor must correspond to the rotation direction arrow on the pump
- Rotation direction check:
  Valves in the pressure and intake line must be open.
  Switch on the motor **briefly** (approx. 1s)

5 Initial startup

5.1 Startup

Danger of damaging the pump
- Never allow screw pumps to run dry.
- An adequate fluid level must be ensured at all times.

- Check the fluid level
- Observe the minimum and maximum liquid level
- Fully open the non-return valves/gate valves in the pressure line
- The tank must be filled with a sufficient quantity of fluid
- Switch on the drive motor
- Protect the drive motor against overload
- Check intake and pressure lines for tightness, prevent air from entering the supply system
- Observe pressure and temperature monitoring devices at regular intervals

5.2 Shutdown

- Switch off the motor
- On dry installations (base version), switch off the pump and wait briefly before closing the supply valves. If the pump is switched off and the valves are closed at the same time, the pump will run on causing a vacuum to develop in the intake channel (pump runs with cavitation - formation of fuel-vapour locks in the fluid), which will damage the pump.

Make sure the pump discharges evenly and quietly.
If operation is to be stopped for more than 6 months, remove the pump and preserve.

5.3 Instructions for operation

Danger of damage to the pump, coupling and motor.
- Do not operate the pump with short intervals.

Frequent switching operations lead to a sharp increase in temperature and load the motor and pump excessively. Avoid excessive loading by limiting operation to a maximum of one switching operation per minute.

- Allow the pump to continue running during shorter switching operations
- Install an appropriate valve to ensure that the medium is not dispersed under pressure

KNOLL
.It works

6 Maintenance

Risk of injury.
When performing any kind of work on the pump:
- **Only carry out work when power supply is disconnected.**
- **Safeguard the pump from starting automatically and being switched on unintentionally.**
- **The pump motor can become very hot, allow to cool before starting work.**

KNOLL screw pumps are maintenance-free.

The pump must be sent to the manufacturing plant if it is damaged inside.

Carrying out repair work independently or opening the pump voids any warranty claims!

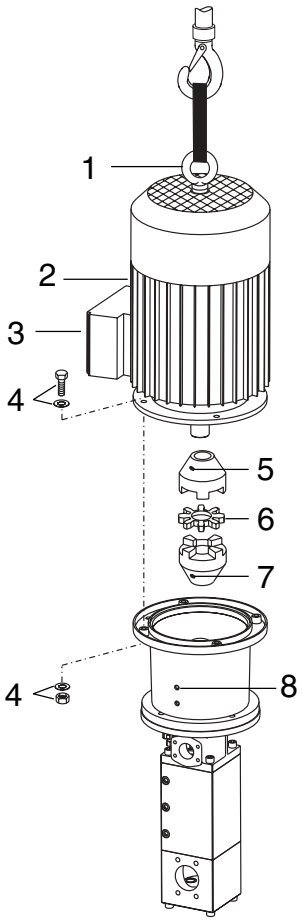
The motor, coupling and pump carrier can all be replaced.

- **When changing the pump, check the cooling liquid for contamination.**
- **The cooling liquid should be kept perfectly clean during installation. (For levels of contamination and acceptable particle size, see page 6).**

6.1 Removing the coupling

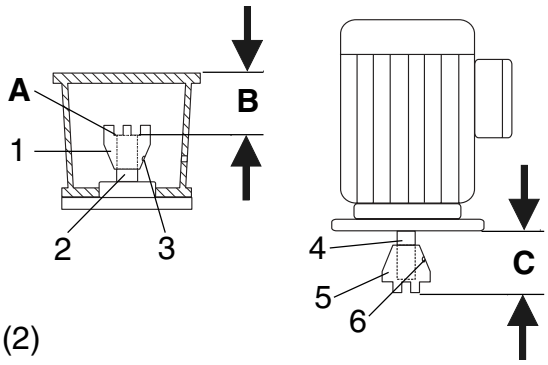
- **Use suitable lifting gear to lift the motor**

- Screw a suitable eye bolt (1) to the drive shaft on the motor (2)
- Disconnect the wiring in the motor terminal box (3)
- Unscrew the mounting screws (4) and lift the motor from the pump carrier
- Unscrew the grub screws (5)
- Remove the plastic part (6) from the coupling
- Unscrew the grub screw (7) through the opening (8) in the pump carrier



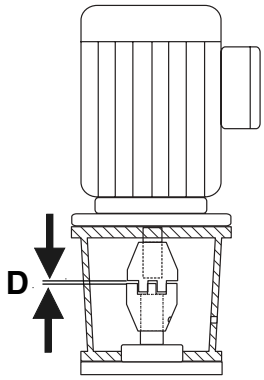
To remove the coupling halves, heat the coupling using a suitable tool (e.g. hot air dryer).

6.2 Fitting the coupling



To fit the coupling, heat both coupling halves using a suitable tool (e.g. hot air dryer).
Apply a light coat of grease to the pump and drive shaft!

- Slide the lower coupling half (1) onto the pump shaft (2) until it is central (A).
- Secure the coupling half using the grub screw (3).
- Measure the distance (B) between the top edge of the pump carrier and the inner surface of the coupling.
- Slide the top coupling half (5) onto the drive shaft (4) and position to the dimension measured minus 1 or 2 mm.



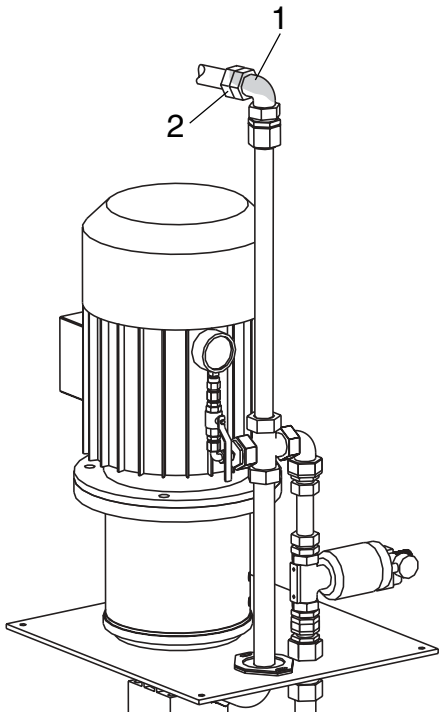
- After successfully fitting the coupling halves, dimension D must be 1 or 2 mm depending on the pump size.

Installation size up to KTS 50, coupling clearance 1 mm, installation size KTS 60 and upwards, coupling clearance 2 mm

7 Faults

7.1 Noises in the pipeline

Risk of injury.
- Lines are pressurised.
- Always take great care when unscrewing bolt connections.



- Air bubbles (1) may become trapped in bends, filters, dual filters etc. installed in the pipeline above the pump and cause vibrations and noise
- This can be remedied by bleeding the pipework
- To achieve this, loosen appropriate bolt connections, e.g. angle connection (2), but do not remove
- Bleed the line until fluid escapes free of bubbles
- Tighten the bolt connection (2) again

KNOLL
.It works

7.2 Correcting malfunctions

Fault	Possible causes	Remedy
The pump is not delivering	Pump rotating in the wrong direction	Change motor rotation direction
	Pump without supply fluid	Refill supply fluid
	Shutoff armature	Open shutoff valves
Pump does not bleed automatically	No ventilation	Fit bleeder valve to the pressure pipe
Pump does not run at full power	Intake pipe leaking	Tighten bolted flange joints, replace gaskets
	Upstream or downstream filter blocked	Clean or replace filter
Pump noisy	Intake pipe leaking	Tighten bolted flange joints, replace gaskets
	Intake level too high	Increase the fluid level in the tank or lower the pump
	Air pockets in supply medium	Improve air dissipation in the tank (see Chapter 6)
	Intake line resistance excessive	Increase line diameter, improve flow performance
	Upstream or downstream filter blocked	Clean or replace filter
Pump seized	Fluid level in tank too low Viscosity too low Pressure too high Primary filter possibly blocked	Send the pump to the manufacturer Rectify the cause of the fault

EC Declaration of Conformity

as per EC Directive for Machines (98/37/ EC)

The company:

Knoll Maschinenbau GmbH
Schwarzachstraße 20
D-88348 Bad Saulgau, Germany

hereby declares that the pump unit

Screw Pump, KTS

complies with the relevant specifications of the EC Machinery Directive (98/37/EC)

The product is manufactured and designed in accordance with the following regulations:

DIN EN ISO12100-1/-2, EN294, EN809; EN60204-1

This declaration does not contain any guarantee of product properties.
The safety instructions in the supplied product documentation must be observed.

Bad Saulgau, Germany, 18.11.2004

Place, date

Head of Design (Nikolaus Harraßer)

Production Manager (Josef Zinsmayer)

Quality Assurance (Ulrich Stotz)

KNOLL
.It works

Knoll Maschinenbau GmbH
Schwarzachstr. 20
D-88348 Bad Saulgau
Tel. +49 (0)7581/2008-0
Fax +49 (0)7581/2008-140
info.itworks@knoll-mb.de
www.knoll-mb.de

16989/KTS-Bed-engl-V2.2.pmd/04.05Wü