Installation and operating instructions

MTS

50/60 Hz

Model K screw pumps

GRUNDFOS

MTS

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Original installation and operating instructions

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1. General information

Read this document before you install the product. Installation and operation must comply with local regulations and accepted codes of good practice.

1.1 Hazard statements

The symbols and hazard statements below may appear in Grundfos installation and operating instructions, safety instructions and service instructions.

DANGER

Indicates a hazardous situation which, if not avoided, will result in death or serious personal injury.

WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious personal injury.

CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate personal injury.

The hazard statements are structured in the following way:

SIGNAL WORD

Description of the hazard

Consequence of ignoring the warning

- Action to avoid the hazard.

1.2 Notes

The symbols and notes below may appear in Grundfos installation and operating instructions, safety instructions and service instructions.

Observe these instructions for explosion-proof products.

A blue or gray circle with a white graphical symbol indicates that an action must be taken.

A red or gray circle with a diagonal bar, possibly with a black graphical symbol, indicates that an action must not be taken or must be stopped.

If these instructions are not observed, it may result in malfunction or damage to the equipment.

Tips and advice that make the work easier.

1.3 Safety

The manufacturer does not accept any liability for damage caused by disregarding the documentation.

1.3.1 General safety instructions

Observe the following regulations before carrying out any work.

Product safety

The pump has been designed according to the latest technology and recognised technical safety regulations. Nevertheless, the operation of the pump can still put the life and health of the user or third party at risk or cause damage to the pump or other property.

- Only operate the pump if it is in perfect technical condition, and only use it as intended, continuously paying attention to safety and risks and complying with the instructions in these installation and operating instructions.
- Keep these installation and operating instructions and all other applicable documents complete, legible and accessible to persons at all times.
- Keep the information on the pump in a complete and legible condition.
- In the event of any safety-related malfunctions, switch off the pump immediately and have the malfunction corrected by qualified persons.
- In addition to the safety instructions given in these installation and operating instructions, comply with statutory or other safety and accident-prevention regulations as well as standards and guidelines applying in the country where the pump is operated.

Obligations of the operating company

Safety-conscious operation:

- Only operate the pump if it is in perfect technical condition, and only use it as intended. See the section on operating conditions.
- Make sure that the following safety regulations are observed:
  - statutory or other safety and accident-prevention regulations
  - safety regulations governing the handling of hazardous substances
  - relevant standards and guidelines applying in the country where the pump is operated.
- Make personal protective equipment available.
- Make sure that all persons working on the pump have read and understood these installation and operating instructions and all other applicable documents, especially the safety, maintenance and repair information, before they start any work.
- Organise responsibilities, areas of competence and the supervision of persons.
- Make sure that the following activities are carried out by specialist technicians only:
  - fitting, repair and maintenance
  - work on the electrical system.
- Make sure that trainee persons only work on the pump under supervision of specialist technicians.

Safety equipment:

- Provide the following safety equipment, and make sure it is in working condition:
  - guards protecting against hot, cold or moving parts
  - appropriate earthing protecting against possible building-up of electrostatic charge
  - appropriate safety valve on the outlet side between the pump and the first isolating valve if there is no pressure-relief valve.

Warranty:

Obtain the manufacturer's approval before carrying out any modifications, repairs or alterations during the warranty period.

Use only original spare parts approved by the manufacturer.

Obligations of users

- Observe all instructions provided on the pump, such as the arrow indicating the direction of rotation and the markings for pipe connections.
- Use personal protective equipment when carrying out any work on the pump.

- Avoid inappropriate use of the pump and components:
  - Do not step on or use them as a climbing aid.
  - Do not use them to support boards, ramps or beams.
  - Do not use them as a fixing point for winches or supports.
  - Do not use them for storing paper or similar materials.
  - Do not use the hot pump or motor components as a heating point.
  - Do not de-ice using gas burners or similar tools.
- Do not remove the safety guards protecting against hot, cold or moving parts during operation.
- Reinstall the safety equipment on the pump as required by regulations after any work on the pump.

Related information

13.2.1 Maximum performance data

1.3.2 Specific hazard

Observe the relevant safety regulations when handling hazardous pumped liquids (hot, flammable, poisonous or potentially harmful liquids).

2. Product introduction

2.1 Product description

The MTS pumps are screw pumps designed for pumping cooling lubricants and cutting oils for machine tool applications such as:

- modern metal machining centres
- grinding and deep-hole drilling machines.

The pump can be mounted on top of tanks with the pump immersed in the pumped liquid, or the pump can be dry-installed to the tank with pipe connections. The pumps consist of a motor and a pump unit. The motor is a Grundfos standard MG motor designed according to EN standards. The pump unit consists of optimized hydraulics, various types of connections, a motor stool and various other parts.

2.2 Intended use

- Only use the pump for the permissible pumped liquids. See the section on pumped liquids.
- Make sure that the pump is always filled with pumped liquid during operation.
- Avoid cavitation:
  - Open the inlet-side valve completely, and do not use it to adjust the flow rate.
  - Open the outlet-side valve completely.
- Avoid damage to the motor:
  - Note the maximum permissible number of starts per hour.
- Consult the manufacturer about any other use of the pump.
- When a pump is supplied without a motor, the pump unit must fulfil the stipulations of the Machinery Directive, 2006/42/EC.

Observe these instructions in order to avoid misuse

- Do not operate the pump outside the operating limits with regard to temperature, pressure, viscosity, flow rate and motor speed.
- Do not operate the pump against a closed outlet-side valve.
- Do not use the pump for foodstuffs if the pump has not been adapted accordingly.
- Only select the installation types described in the installation and operating instructions:
  - do not install the pump hanging in the pipe
  - do not install the pump very close to sources of extreme heat or cold
  - do not install the pump too close to a wall.

Related information

2.3 Pumped liquids

2.3 Pumped liquids

The pumped liquids must not attack the pump materials. The composition, oil content (ability to provide lubrication) and cooling effect of the liquid determine the pump maintenance intervals and maximum permissible loading.

The permissible pumped liquids according to DIN 51385 are divided into three groups according to water and oil content.

Solutions (L)

- Inorganic materials in water
- dispersions of organic and synthetic materials in water.

Emulsions (E)

Oil in water, oil content E 2 % to E 20 %.

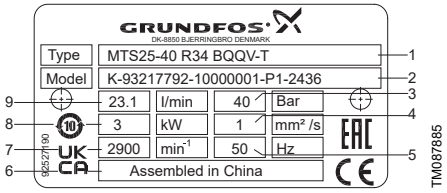
Cutting and grinding oils (S)

- without additives
- with polar, physically effective additives
- with mild-effect, lubricating film forming EP additives
- with polar and mild-effect EP additives
- with active, chemical additives
- with polar and active EP additives.

Main group	Effect at the processing spot
L	High cooling effect, low lubricating effect
E	Cooling and lubricating effect
S	High lubricating effect, low cooling effect
	High surface adhesion providing protection against corrosion
	High temperature and pressure resistance

2.4 Identification

2.4.1 Nameplate



Example of a nameplate

Pos.	Description
1	Type designation [1]
2	Model [2]
3	Pressure [bar]
4	Kinematic viscosity [mm^2/s]
5	Frequency [Hz]
6	Country of production
7	Speed [rpm]
8	Power consumption [kW]
9	Rated flow rate [l/min]

2.4.2 Type key

Example: MTSE 25-40 R38 BQQV T

Code	Explanation
MTS	Pump type
E	Pump with E-motor
25	Frame size
40	Maximum pressure (bar) Pressure range: 10 to 100 bar
R	Spindle sense of gradient (R = right)
38	Spindle pitch angle in degrees Further spindle pitch angles: R34 R38 R48 R50 R60 R64 R76
BQQV	Mechanical shaft seal
T	T = Pump for tank-top installation D = Pump for dry installation H = Pump for horizontal installation

2.4.3 Model code

Example: E 99237777 10000001 P3 2436

Code	Explanation
E	Model
99237777	Product number
10000001	Serial number
P3	Place of production
2436	Production year and week

3. Receiving the product

3.1 Inspecting the product

Before installing the product, do the following:

1. Check if the product is as ordered.
2. Check if no visible parts are damaged.
3. If parts are damaged or missing, contact your local Grundfos sales company.

3.2 Handling and lifting the product

To handle the MTS model K pump correctly, consider the following

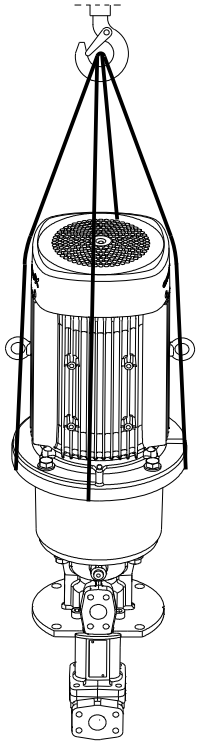
WARNING
Personal injury
Death or serious personal injury
- Use lifting equipment designed for supporting the total weight to be transported.

WARNING
Death or serious personal injury
- Fasten the lifting equipment as shown in the figures below.

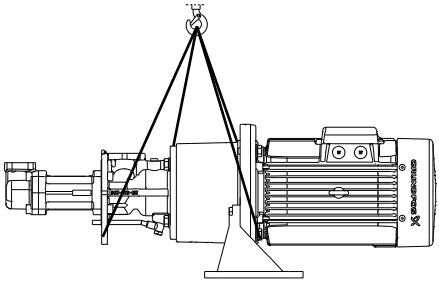
WARNING
Personal injury
Death or serious personal injury
- For vertical lifting, provide a safety rope between the hook and the motor eyebolt.

WARNING
Personal injury
Death or serious personal injury
- Never fasten the lifting equipment to the motor eyebolt, unless used as a safety precaution against tipping over. This is especially relevant for units with a high centre of gravity.

WARNING
Personal injury
Death or serious personal injury
- Do not stand under suspended loads.



Vertical lifting



Horizontal lifting

4. Installation requirements

4.1 General precautions

Do not stress the bearing or pass electrical current through the bearing as this will cause material damage.

Do not make any structural modifications to the pump unit or pump housing.

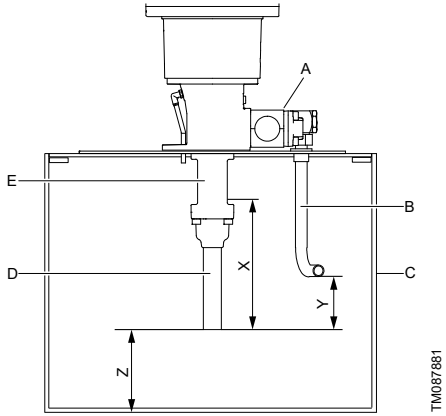
Do not carry out any welding work on the pump unit or pump housing.

Do not remove any plastic covers or screw plugs until immediately before connecting the pipes to the pump.

CAUTION
Hot surface
Minor or moderate personal injury

- The pump must be installed so that persons cannot accidentally come into contact with the hot surface of the motor.

4.2 Installation information



Pos.	Description
A	Pressure-relief valve
B	Pressure-relief line (excess pressure)
C	Container
D	Inlet line
E	Pump housing

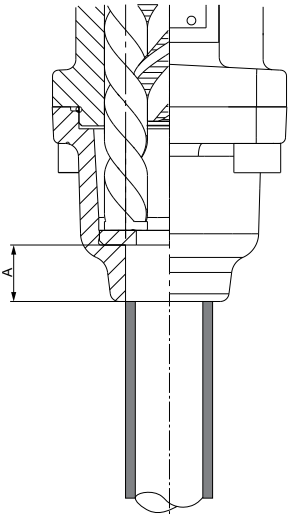
Dimension X ≥ 50 mm: to prevent the pump from running dry, the lower edge of the inlet pipe must extend at least 50 mm into the cooling lubricant even when the cooling lubricant is at a minimum level.

Dimension Y = 0 mm to 50 mm: to prevent drawing in air bubbles, the pressure-relief line must not extend past the lower edge of the inlet pipe.

Dimension Z = 25 mm: the lower edge of the inlet pipe must be at least 25 mm above the bottom of the container. We recommend an inlet distance of minimum 100 mm from the tank bottom to avoid impurities to be sucked into the pump.

4.3 Mounting of the inlet pipe

When mounting the inlet pipe, do not exceed the maximum 18 mm thread length.



Maximum thread length (A)

4.4 Mounting with pipe and thread sealing liquid

1. Apply pipe sealing liquid between the second and fourth thread pitch.

2. Screw in the threaded pipe by hand with approximately 10 Nm.
3. Mark the position.

4. Screw in the pipe with 90 degrees more, with approximately 15 Nm.

4.5 Mounting with pipe and PTFE-tape

1. Apply the PTFE-tape at the pipe thread, with approximately 3 layers.

2. Screw in the threaded pipe by hand with approximately 10 Nm.
3. Mark the position.

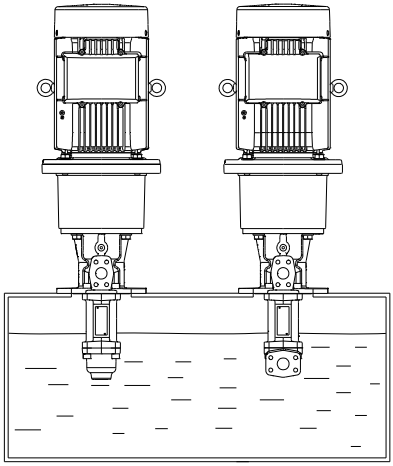
4. Screw in the pipe with 90 degrees more, with approximately 15 Nm.

5. Mechanical installation

5.1 Installation types

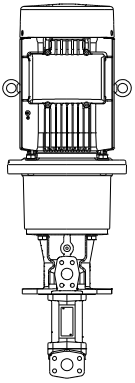
The MTS Model K pumps can be mounted in three types of installation:

- tank-top installation
- dry installation with flange
- dry installation with horizontal mounting foot.



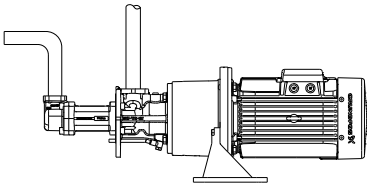
TM087644

Tank-top installation



TM087645

Dry installation with flange



TM087646

Dry installation with horizontal mounting foot

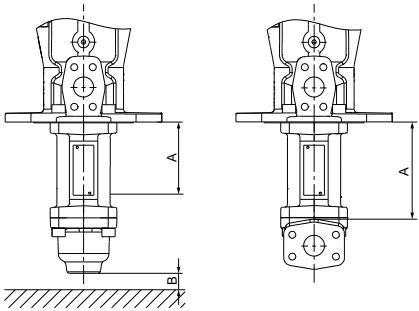
5.2 Inlet conditions

The following applies to pumps installed in tanks. To protect the pump at startup and to ensure correct performance, observe the requirements in the table below.

Pump type	A [mm]	B [mm]
MTS 25	Max. 127	Min. 25
MTS 32	Max. 179	Min. 25

Dimension **A [mm]** can be extended by the length of an inlet pipe, if installed.

For dimension **B [mm]**, we recommend an inlet distance of minimum 100 mm from the tank bottom to avoid any potential impurities to be sucked into the pump.



TM087651

Design types Axial (left) and SAE (right)

5.3 Pressure-relief valves

The opening pressure of the pressure-relief valve must be set to approximately 10 % higher than the operating pressure of the pump.

Select the pressure-relief valve based on the application.

5.4 Accessories for pipes

Pipes connected by the customer must not place any stress on the pump.

Avoid unnecessary changes in direction and pipe cross-section.

Do not select pipes with a nominal size smaller than that of the pump.

1. Clean all pipe elements and fittings of the pipes.
   a. Remove any burrs and welding beads.
      Flange gaskets must not protrude inwards.
2. Use a pressure-relief valve to protect the screw pump from exposure to excess pressure.
   Starting the pump without a pressure-relief valve is not permitted.
3. Ensure that the pressure-relief line is not under pressure.
   No back pressure must be allowed to build up in the line.
   Direct-actuated, or fast-closing, fittings can generate pressure spikes.
4. Use pilot-operated, or slow-closing, fittings.
   Dynamic pressure changes must be kept within permissible limits, that is, below 20 bar / 0.1 sec.

6. Electrical connection

WARNING
Electric shock
Death or serious personal injury

- Switch off the power supply before you start any work on the product. Make sure that the power supply cannot be switched on accidentally.
- Connect the pump to an external main switch close to the pump and to a motor-protective circuit breaker or a CUE frequency converter. Make sure that you can lock the main switch in OFF position (isolated). Type and requirements as specified in EN 60204-1, 5.3.2.

The user is to consider whether it is necessary to install an emergency stop switch.

The operating voltage and frequency are marked on the motor nameplate. Make sure that the motor is suitable for the power supply on which it will be used and the motor terminal connection is correct. You will find a wiring diagram in the terminal box.

6.1 Frequency converter operation

All three-phase motors supplied by Grundfos can be connected to a frequency converter. The frequency converter must be set to operation with a constant torque.

Depending on the frequency converter type, this may cause increased acoustic noise from the motor. Furthermore, it may also cause the motor to be exposed to detrimental voltage peaks.

Grundfos motor type MG 90 (1.5 kW, 2-pole) for supply voltages up to and including 440 V (see the motor nameplate) must be protected against voltage peaks higher than 650 V (peak value) between the supply terminals.

We recommend to protect all other motors against voltage peaks higher than 850 V.

The above disturbances, that is both increased acoustic noise and detrimental voltage peaks, can be eliminated by fitting an LC filter between the frequency converter and the motor.

For further details, please contact your frequency converter or motor supplier.

7. Starting up the product

DANGER
Electric shock
Death or serious personal injury
- Only qualified electricians may work on the electrical equipment.

CAUTION
Crushing of hands
Minor or moderate personal injury
- Do not reach into inlet, outlet or assembly openings.

CAUTION
Chemical hazard
Minor or moderate personal injury
Health risk from contact with cooling lubricant, contamination of the environment
- Avoid skin contact with the cooling lubricant.

7.1 First startup

7.1.1 Check before initial startup

Before the initial startup, make sure the following precautions are observed:

- Pipes are connected to the pump.
- The required accessories are installed according to the order confirmation.
- The drive is electrically connected.
- The direction of rotation is correct.

1. Check the attached lines for leaks.
2. Fully open the stop valves in the inlet line.
3. Optionally, fill the mechanical shaft seal to facilitate pump start. See the relevant section. The pump is factory-lubricated for self-priming.
4. Fill the supply tanks with liquid.
5. Fill the inlet line with liquid until liquid escapes without any air.

The pump is ready for use.

Never allow screw pumps to run dry.

Always ensure there is a sufficient supply of liquid.

The liquid may not contain more than 3-5 % by volume air.

In all screw pumps, the pressure difference between the inlet and outlet connections must be adjusted to a minimum by 1 to 2 bar of an additional pressure-regulating valve. The pressure difference may not be less than 1 bar.

Related information

7.1.2 Filling the mechanical shaft seal

11.3 Removing corrosion inhibitor

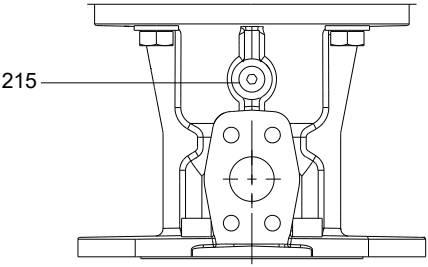
7.1.2 Filling the mechanical shaft seal

Before filling the mechanical shaft seal, make sure the system is switched off.

1. Remove the screw plug (215) from the shaft seal opening.
2. Fill the mechanical shaft seal with approximately 100 ml of filtered liquid.
3. Close the mechanical shaft seal opening with the screw plug (215).

   Leakage from the mechanical shaft seal can be detected by the exit of liquid through the mechanical shaft seal compensating line.

When mounting the inlet pipe, do not exceed the maximum 18 mm thread length.



Accessing the shaft seal via the screw plug

Related information

13.1 MTS model K position numbers

7.1.3 Bleeding the pipes

Before bleeding the pipes, make sure the system is switched off.

1. Loosen the pipe fitting slightly.
2. Bleed the pipe until the liquid exits with no bubbles.
3. Retighten the pipe fitting.

Repeat the procedure on the downstream pipe fittings.

Air bubbles may become trapped in the pipes at elevated elbows, filters, causing vibration and noise.

7.1.4 Checking the direction of rotation

Do not start the pump to check the direction of rotation until it has been filled with liquid.

1. Switch on the motor for a couple of seconds.
2. Make sure the motor turns clockwise as seen from the motor fan.

   There is a sticker at the top of the fan cover to indicate the proper direction of rotation.
3. If the direction of rotation is wrong, exchange two phases in the power supply.

7.1.5 Switching on the product

Before switching on the product, make sure the drive is electrically connected.

1. Fill and bleed the pump.
2. Prevent air from entering into the system.
3. Fully open the stop valves in the inlet line.
4. Switch on the drive motor.

   During operation, monitor for any faults.

   Do not operate the screw pump for brief intervals, that is, less than one on/off actuation cycle per minute. When switching the pump on and off for shorter intervals, allow it to reach full speed.

   Maintain the minimum and maximum liquid levels.

   Check the pressure and temperature monitoring devices at regular intervals.

   The floating seal rings may become stuck after a long downtime. Rotate the pump manually.

Related information

7.1.3 Bleeding the pipes

7.1.6 Checks during operation

Carry out maintenance activities on a regular basis.

1. Make sure the pump runs smoothly and does not vibrate.
2. Conduct regular inspections.
3. Check the seals for leakage.

7.1.7 Mechanical shaft seal

Mechanical shaft seals are subject to natural wear that strongly depends on the operating conditions. Therefore, general statements regarding their service life cannot be made. Mechanical shaft seals have functional leaks. In the event of major leaks, replace the shaft seal and its auxiliary seals.

7.1.8 Switching off the product

1. Switch off the drive motor and confirm that the liquid discharges smoothly.
2. To prevent cavitation, close the shut-off valves only after the rotor comes to a stop.

   In dry installations, close the supply valves with a time delay.

   If the supply valves are closed simultaneously with switching off the screw pump, the after-running of the pump creates a vacuum in the inlet line. The pump experiences cavitation, that is, the formation of vapor bubbles in the liquid that can damage the pump.

8. Servicing the product

DANGER
Electric shock
Death or serious personal injury

- Only qualified electricians may work on the electrical equipment.

CAUTION
Automatic startup
Minor or moderate personal injury

- Before beginning maintenance work, turn off the mains disconnect switch and secure against unintentional startup.

CAUTION
Chemical hazard
Minor or moderate personal injury
Health risk from contact with cooling lubricant, contamination of the environment

- Wear personal protective equipment.
- Avoid contact with the cooling lubricant.
- Follow the safety instructions of the cooling lubricant manufacturer.
- Heed the legal provisions for setup of the system and the disposal of the cooling lubricants.

CAUTION
Hot surface
Minor or moderate personal injury

- Note the product temperature.
- Allow the pump to cool.
- Wear personal protective equipment.

8.1 Maintenance intervals

During normal operation, regular maintenance is required at the following intervals:

- Weekly
- after 500 operating hours (at least monthly)
- after 1500 operating hours (at least quarterly)
- after 3000 operating hours (at least semiannually)
- after 6000 operating hours (at least annually)
- multiple-year intervals.

When operating under stringent requirements, shorten the intervals.

For service activities and intervals for third-party accessories, see the operating instructions of the manufacturer.

Related information

8.2 Maintenance chart
13.2.1 Maximum performance data

8.2 Maintenance chart

Weekly

Component	Action	Comment
Pump	Visually inspect for leakage.	In the event of a leakage, repair the leak and change the shaft seal.

After 1500 operating hours

Component	Action	Comment
Protective devices	Confirm proper operation, and clean.	
Drive motor	Clean the cooling air openings and the housing.	Clean the components with dry compressed air.

After 3000 operating hours

Component	Action	Comment
Housing	Check for leaks, damage and corrosion.	Make sure that environmentally hazardous substances do not escape.

After 6000 operating hours

Component	Action	Comment
Electrical system: wiring	Check for breaks and damage.	Replace any defective wire.

8.3 Motor maintenance

Carry out maintenance as described in the instructions for the motor supplied with the pump.

Maintaining the Grundfos MG motor

Motors not fitted with grease nipples are maintenance-free.

Motors fitted with grease nipples must be lubricated with a high-temperature, lithium-based grease. See the instructions on the fan cover.

In the case of seasonal operation where the motor is idle for more than 6 months of the year, grease the motor when you take the pump out of operation.

Depending on the ambient temperature, replace or lubricate the motor bearings according to the tables below.

The tables apply to 2-pole motors.

Intervals for 4-pole motors are twice as long as those for 2-pole motors.

If the ambient temperature is lower than 40 °C, replace or lubricate the bearings at the same intervals as for 40 °C.

Bearing replacement intervals for 2-pole MG motors

Motor size [kW]	Bearing replacement interval [operating hours] [3]				
	40 °C	45 °C	50 °C	55 °C	60 °C
0.37 - 0.75	18000	-	-	-	-
1.1 - 7.5	20000	15500	12500	10000	7500

3) The number of operating hours stated for bearing replacement are guidelines only.

Lubrication intervals for 2-pole MG motors

Motor size [kW]	Lubrication interval [operating hours]				
	40 °C	45 °C	50 °C	55 °C	60 °C
11 - 18.5	4500	3400	2500	1700	1100
22	4000	3100	2300	1500	1000

8.4 Repairing the product

8.4.1 Disassembling

Before disassembling the pump, make sure the following requirements have been fulfilled:

- The pump has been depressurised.
- The outlet-side isolating valve has been closed.
- The pump is completely empty, flushed and decontaminated.
- All electrical connections have been disconnected and the motor cannot be accidentally switched on again.
- The pump has cooled down.
- The coupling guard has been dismounted.
- The spacer has been removed if the coupling is a spacer coupling.
- Auxiliary systems have been shut down, depressurised and emptied.
- Pressure gauge lines have been dismounted.

Observe the following during disassembling:

- Mark the precise orientation and position of all components before dismounting them.
- Disassemble components concentrically without tilting them.
- For disassembling of the pump, see the section on constructional drawings in the appendix.

8.4.2 Re-installing

Install the components concentrically without tilting them, in accordance with the markings made.

Observe the following during re-installation:

- Always replace lost or damaged screws with screws of the same strength class.
- Replace worn parts with genuine spare parts.
- Replace seals with new seals of the same materials, inserting them in such a way that they are unable to rotate.
- Tighten screws and nuts to the prescribed tightening torques. See the section on tightening torques.
- Clean all parts. Do not remove any markings.
- Assemble the pump. See the section on constructional drawings in the appendix.
- Install the pump in the system. See the section on installing the product.

Related information

4.1 General precautions
4.2 Installation information
8.4.3 Tightening torques
8.6.1 Adjusting the coupling

8.4.3 Tightening torques

The values in the table apply to oiled screws when using torque wrenches.

Thread size	Tightening torque [Nm] at 8.8 strength class
M10	23
M12	40
M16	100

Note that suggested tolerance for each value is ± 5 Nm.

8.5 Ordering spare parts

Parts which can be replaced can be found in the list in the section on position numbers.

Please have the following information ready when ordering spare parts:

- pump type
- model and serial number
- production year and week
- part number
- designation
- quantity.

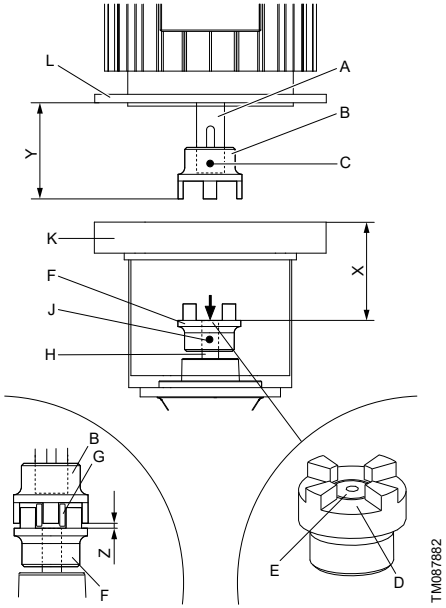
For trouble-free replacement in the event of faults, we recommend keeping a spare pump available on site.

Related information

13.1 MTS model K position numbers

8.6 Coupling

8.6.1 Adjusting the coupling



Pos.	Description
A	Motor drive shaft
B	Upper half of coupling
C	Set screw, upper half of coupling
D	Surface of lower half of coupling
E	Surface of pump drive shaft
F	Lower half of coupling
G	Pinion gear
H	Pump drive shaft
J	Set screw, lower half of coupling
K	Pump carrier
L	Drive motor
X	Distance between the lower half of coupling and the top edge of pump carrier
Y	Distance between the motor drive and the upper half of coupling
Z	Distance between the lower half of the coupling and the upper half of the coupling

To assemble the upper and lower coupling halves, heat them with an appropriate tool, for example, a hot air blower.

Apply a light coat of grease to the pump and motor drive shafts.

1. Slide the lower half of the coupling onto the pump drive shaft.
2. Check if the surface of the lower half of the coupling and the surface of the pump drive shaft are even.
3. Tighten the set screw in the lower half of the coupling.
4. Measure the distance between the lower half of the coupling and the top edge of the pump carrier (dimension X).
5. Slide the upper half of the coupling onto the motor drive shaft.
6. Adjust the coupling clearance based on its size as specified in the manufacturer's information.

   Dimension Y = Dimension X minus Dimension Z
7. Dimension Z = 1 mm.
8. Tighten the set screw in the upper half of the coupling.

8.7 Service documentation

Service documents are available in Grundfos Product Center at http://product-selection.grundfos.com.

8.8 Returning the pump to the manufacturer

Before returning the pump, make sure the following requirements have been fulfilled:

- The pump has been depressurised.
- The pump is completely empty.
- All electrical connections have been disconnected and the motor cannot be accidentally switched on again.
- The pump has cooled down.
- The coupling guard has been dismounted.
- The spacer has been removed if the coupling is a spacer coupling.
- Auxiliary systems have been shut down, depressurised and emptied.
- Pressure gauge lines have been dismounted.

Before returning the pump to the manufacturer, take necessary measures, depending on the required repair work, as listed in the table below.

Place of repair	Action before return
Customer's premises:	• Dismount the defective component and return it to the manufacturer.
Manufacturer's premises:	• Flush the pump and decontaminate it if it was used for hazardous pumped liquids.
Manufacturer's premises for warranty repairs:	• Return the complete pump, not dismantled, to the manufacturer.

9. Starting up after standstill

1. If the pump has been shut down for over six months, take the following measures before starting it up again:
   - Replace elastomer seals (O-rings, shaft seal rings).
   - Replace anti-friction bearings in the pump.
   - Replace the motor bearing, if necessary.
2. Carry out all steps as for the first startup. See the section on first startup.

Related information

7. Starting up the product

10. Taking the product out of operation

CAUTION
Corrosive liquids
Minor or moderate personal injury
- Wear personal protective equipment.

CAUTION
Toxic liquids
Minor or moderate personal injury
- Wear personal protective equipment.

CAUTION
Hot or cold liquid
Minor or moderate personal injury
- Wear personal protective equipment.

CAUTION
Hot or cold surface
Minor or moderate personal injury
- Make sure that no one can accidentally come into contact with hot or cold surfaces.

Issue	Action
The pump is to be shut down for a long period.	Take measures suited to the pumped liquids in the table below.
The pump is to be emptied.	Close the inlet-side and outlet-side valves and drain the pump by removing the drain plug and turning the pump manually until the pump is empty.
The pump is to be dismounted.	Switch off the power supply, and make sure it cannot be accidentally switched on.
The pump is to be stored.	Follow the storage instructions, see the section on storage.

Take the following measures whenever the pump is shut down:

Behaviour of the pumped liquid	Duration of shutdown (depending on process)	
	Short	Long
Solids sedimenting	Flush the pump.	Flush the pump.
Solidifying or freezing, non-corrosive	Heat up or empty the pump and the tanks.	Empty the pump and the tanks.
Solidifying or freezing, corrosive	Heat up or empty the pump and the tanks.	Empty the pump and the tanks, and apply corrosion inhibitor to them.
Remaining liquid, non-corrosive	-	-
Remaining liquid, corrosive	-	• Empty the pump and tanks. • Apply corrosion inhibitor to the pump and tanks.

Related information

11.2 Storage

11. Storing the product

The pump has not been treated for storage from factory.

Prepare the pump for storage as described below to avoid material damage.

Related information

3.2 Handling and lifting the product

11.1 Preparation for storage

Prepare the pump properly for storage both inside and outside.

Use RUST-BAN 335, for example, as corrosion inhibitor.

Applying corrosion inhibitor to the inside of the pump

1. Close the inlet-side flange with a blind flange.
2. Fill the pump with corrosion inhibitor.
3. Turn the shaft slowly by hand against the direction of rotation.
4. Continue filling and turning until corrosion inhibitor comes out of the outlet-side flange without bubbles.
5. Close the outlet-side flange with a blind flange.

Applying corrosion inhibitor to the outside of the pump

Apply corrosion inhibitor to all bare metal parts using a brush or spray can.

11.2 Storage

1. Seal all openings with blind flanges, blind plugs or plastic covers.
2. Make sure the storage room meets the following conditions:
   - dry
   - frost-free
   - vibration-free
   - dust-free.
3. Turn the shaft once a month and make sure the shaft and bearing change position in the process.

11.3 Removing corrosion inhibitor

This section applies to pumps treated with corrosion inhibitor.

High water pressure or spray water can damage bearings.

Do not clean bearing areas with a water or steam jet.

Using wrong cleaning agent may cause damage to the seals.

Make sure the cleaning agent does not corrode the seals.

1. Select a cleaning agent from the following options:
   - benzene
   - wax solvents
   - diesel
   - paraffin
   - alkaline cleaner.
2. Remove the corrosion inhibitor from all bare internal parts of the pump.
3. Dispose of the cleaning agent in accordance with local environmental rules and requirements.
4. If storage time exceeds six months, check all elastomer parts (O-rings, shaft seals) for proper elasticity and replace them if necessary.

12. Fault finding the product

WARNING
Electric shock
Death or serious personal injury
- Switch off the power supply before you start any work on the product. Make sure that the power supply cannot be switched on accidentally.

WARNING
Moving parts
Death or serious personal injury
- Tighten the coupling screws to the correct torque.
- Install the coupling guards securely to the pump with the screws intended for this purpose.

CAUTION
Corrosive liquids
Minor or moderate personal injury
- Wear personal protective equipment.

CAUTION
Toxic liquids
Minor or moderate personal injury
- Wear personal protective equipment.

CAUTION
Hot or cold liquid
Minor or moderate personal injury
- Wear personal protective equipment.

CAUTION
Hot or cold surface
Minor or moderate personal injury
- Make sure that no one can accidentally come into contact with hot or cold surfaces.

Related information

7.1.4 Checking the direction of rotation

12.1 The screw pump does not work

Cause	Remedy
There is no power supply.	Check the power supply.
The motor drive is defective.	Check the motor drive.
The motor protection switch has tripped.	Check the electrical cables and the motor drive for short circuits.

12.2 The motor-protection switch trips

Cause	Remedy
The motor drive is defective.	Check the motor drive.

12.3 The screw pump does not deliver liquid

Cause	Remedy
The direction of rotation is incorrect.	Check the direction of rotation. See the nameplate.
The shut-off valve is closed.	Open the shut-off valve.

12.4 The pump delivery rate is insufficient

Cause	Remedy
The inlet pipe is leaking.	Tighten the bolted flange joints, and replace the gaskets.
The upstream or downstream filter is clogged.	Clean or replace the filter.

12.5 There are loud noises

Cause	Remedy
The inlet pipe is leaking.	Tighten the bolted flange joints, and replace the gaskets.
The inlet level is too high.	Increase the liquid level in the tank, or lower the pump.
Air is trapped in the pressure line.	Bleed the lines.
The inlet pipe resistance is excessive.	Increase the diameter of the line, position for a less restricted flow.
The upstream or downstream filter is clogged.	Clean or replace the filter.

12.6 The pump has seized

Cause	Remedy
The liquid level in the tank is too low. The viscosity is too low. The pressure is too high. The upstream filter is defective.	Replace the pump, and return the defective pump to the manufacturer for repair.

13. Technical data

13.1 MTS model K position numbers

The position numbers in the table below refer to the MTS model K constructional drawings in the appendix. See the section on constructional drawings in the appendix.

Pos.	Description
1	Outlet casing
2	Rotor housing
4	Inlet casing
12	Drive screw
13	Idler screw
121 [4]	O-ring
132 [4]	O-ring
133 [4]	O-ring
141	Gasket
186 [4] [5]	Mechanical shaft seal
188	Supporting washer
200	Hexagon socket head screw
215	Screw plug
230	Thrust disc
232	Rubber disc
250 [4]	Circlip
251	Circlip
252 [4]	Circlip
260 [4]	Bearing housing
264 [4]	Supporting washer
290	Key
292 [4]	Deep-groove ball bearing
400 [6]	Adapter
420 [6]	Tube
970	Nameplate

[4] It is included in a repair kit.

[5] It can be ordered as a mechanical seal kit.

[6] It can be ordered as a hose kit.

For service kit numbers, see the Grundfos Product Center at http://product-selection.grundfos.com.

13.2 Operating conditions

13.2.1 Maximum performance data

Delivery pressure	100 bar
Temperature of pumped liquid	80 °C
Flow rate, inlet line	1 m/s
Flow rate, outlet line	3 m/s
Supply pressure with mechanical seal under load (G)	< 8 bar
Miscellaneous data:	
Kinematic viscosity of liquid being pumped	1-75 mm²/s (cST)
Percentage of concentrate in cooling lubricants and emulsions	min. 2 %

The maximum pressure depends on the configuration, rotational speed, viscosity and the liquid used.

The values indicated may not necessarily be reached.

13.2.2 Filtration

To reach an acceptable pump life, we recommend that you filtrate the cooling lubricants to the following cleanness classes according to the ISO 4406/99. The recommended cleanness class depends on the pumping pressure and abrasive class 1 to 7.

There are process examples for abrasive classes provided in the table below.

The additional specifications to filter mesh and mass proportion are guide values for orientation. The decisive factor is the cleanness of the liquid indicated by the cleanness class.

To avoid damage by coarse particles, we recommend that you use a filter mesh of 65 µm (nominal, two dimensional) or finer.

	Abrasive class					
	1		**2**		**3**	
Material	Steel, GG, Al		Steel, GG, Al		Al (Si > 5 %)	
Process	Drilling		Turning / milling		Turning / milling	
Tool	HSS		Tungsten carbide		Tungsten carbide	
Pressure stage	Oil	Emulsion	Oil	Emulsion	Oil	Emulsion
≤ 100 bar	21/19/16	**21/19/16**	21/19/16	**21/19/16**	**21/19/16**	**21/19/16**
	≤ 30 µm	**≤ 30 µm**	≤ 25 µm	**≤ 25 µm**	**≤ 20 µm**	**≤ 20 µm**
	30 mg/l	**≤ 30 mg/l**	≤ 25 mg/l	**≤ 25 mg/l**	**≤ 20 mg/l**	**≤ 20 mg/l**
≤ 80 bar	22/20/17	22/20/17	22/20/17	22/20/17	22/20/17	22/20/17
	≤ 50 µm	≤ 50 µm	≤ 45 µm	≤ 45 µm	≤ 40 µm	≤ 40 µm
	≤ 60 mg/l	≤ 60 mg/l	≤ 60 mg/l	≤ 60 mg/l	≤ 40 mg/l	≤ 40 mg/l
≤ 60 bar	23/21/18	23/21/18	23/21/18	23/21/18	23/21/18	23/21/18
	≤ 60 µm	≤ 60 µm	≤ 55 µm	≤ 55 µm	≤ 50 µm	≤ 50 µm
	≤ 120 mg/l	≤ 120 mg/l	≤ 100 mg/l	≤ 100 mg/l	≤ 60 mg/l	≤ 60 mg/l
≤ 30 bar	24/22/19	24/22/19	24/22/19	24/22/19	24/22/19	21/19/16
	≤ 70 µm	≤ 70 µm	≤ 55 µm	≤ 55 µm	≤ 55µm	≤ 55µm
	≤ 160 mg/l	≤ 160 mg/l	≤ 160 mg/l	≤ 160 mg/l	≤ 140 mg/l	≤ 140 mg/l

Note that values **in bold** suggest a shorter operating life for the pump.

	Abrasive class							
	4		5		6		7	
Material	Steel		Steel, hard		Hard metal		Titanium	
Process	Grinding		Grinding		Grinding		Grinding	
Tool	Corundum		Corundum		CBN		Diamond	
Pressure stage	Oil	Emulsion	Oil	Emulsion	Oil	Emulsion	Oil	Emulsion
≤ 100 bar	**20/18/15**	**20/18/15**	**20/18/15**	**20/18/15**	**19/17/14**	**19/17/14**	**18/16/13**	**18/16/13**
	≤ 17 µm	**≤ 17 µm**	**≤ 15 µm**	**≤ 15 µm**	**≤ 10 µm**	**≤ 10 µm**	**≤ 6 µm**	**≤ 6 µm**
	≤ 15 mg/l	**≤ 15 mg/l**	**≤ 10 mg/l**	**≤ 10 mg/l**	**≤ 5 mg/l**	**≤ 5 mg/l**	**≤ 3 mg/l**	**≤ 3 mg/l**
≤ 80 bar	21/19/16	21/19/16	**21/19/16**	**21/19/16**	**20/18/15**	**20/18/15**	**19/17/14**	**19/17/14**
	≤ 30 µm	≤ 30 µm	**≤ 20 µm**	**≤ 20 µm**	**≤ 15 µm**	**≤ 15 µm**	**≤ 6 µm**	**≤ 6 µm**
	≤ 30 mg/l	≤ 30 mg/l	**≤ 20 mg/l**	**≤ 20 mg/l**	**≤ 10 mg/l**	**≤ 10 mg/l**	**≤ 10 mg/l**	**≤ 10 mg/l**
≤ 60 bar	22/20/17	22/20/17	22/20/17	**22/20/17**	**21/19/16**	**21/19/16**	**20/18/15**	**20/18/15**
	≤ 50 µm	≤ 50 µm	≤ 40 µm	**≤ 40 µm**	**≤ 20 µm**	**≤ 20 µm**	**≤ 10 µm**	**≤ 10 µm**
	≤ 60 mg/l	≤ 60 mg/l	≤ 40 mg/l	**≤ 40 mg/l**	**≤ 20 mg/l**	**≤ 20 mg/l**	**≤ 15 mg/l**	**≤ 15 mg/l**
≤ 30 bar	23/21/18	23/21/18	23/21/18	23/21/18	**22/20/17**	**22/20/17**	**21/19/16**	**21/19/16**
	≤ 80 µm	≤ 80 µm	≤ 60 µm	≤ 60 µm	**≤ 40 µm**	**≤ 40 µm**	**≤ 10 µm**	**≤ 10 µm**
	≤ 120 mg/l	≤ 120 mg/l	≤ 80 mg/l	≤ 80 mg/l	**≤ 40 mg/l**	**≤ 40 mg/l**	**≤ 15 mg/l**	**≤ 15 mg/l**

Note that values **in bold** suggest a shorter operating life for the pump.

13.3 Noise emission data

At a workplace, a sound-pressure level of Lpa ≤ 78 dB(A) is specified (sound-pressure level at the measurement surface).

This is defined as an energy-equivalent A-rated total noise level determined with the enveloping surface method, according to the DIN 45635 Part 1 Class 2.

Unfavorable environmental conditions and flow noise may require additional sound protection measures.

14. Disposing of the product

This product or parts of it must be disposed of in an environmentally sound way.

1. Use the public or private waste collection service.
2. If this is not possible, contact the nearest Grundfos company or service workshop.

	The crossed-out wheelie bin symbol on a product means that it must be disposed of separately from household waste. When a product marked with this symbol reaches its end of life, take it to a collection point designated by the local waste disposal authorities. The separate collection and recycling of such products will help protect the environment and human health.

See also end-of-life information at *www.grundfos.com/product-recycling*.

15. Document quality feedback

To provide feedback about this document, scan the QR-code using your phone's camera or a QR code app.

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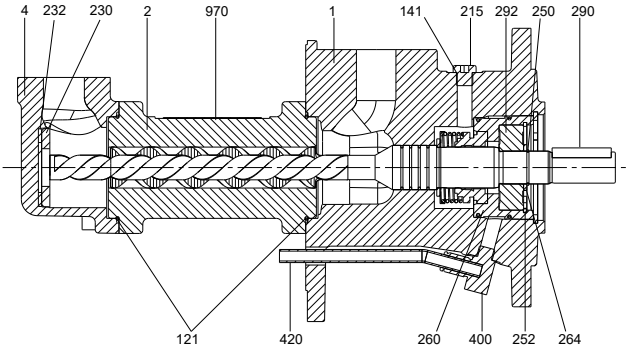
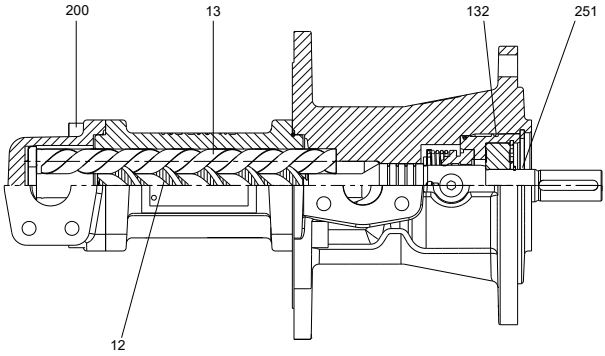
A.1. Constructional drawings

MTS model K sectional drawings





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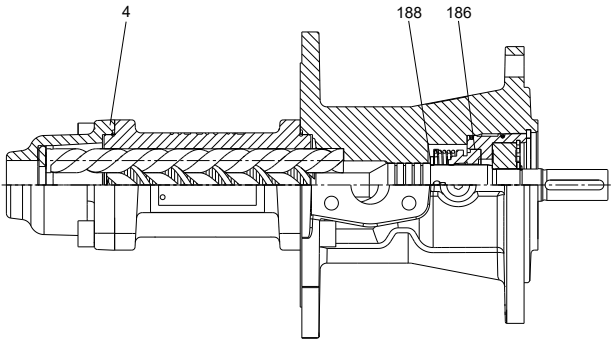

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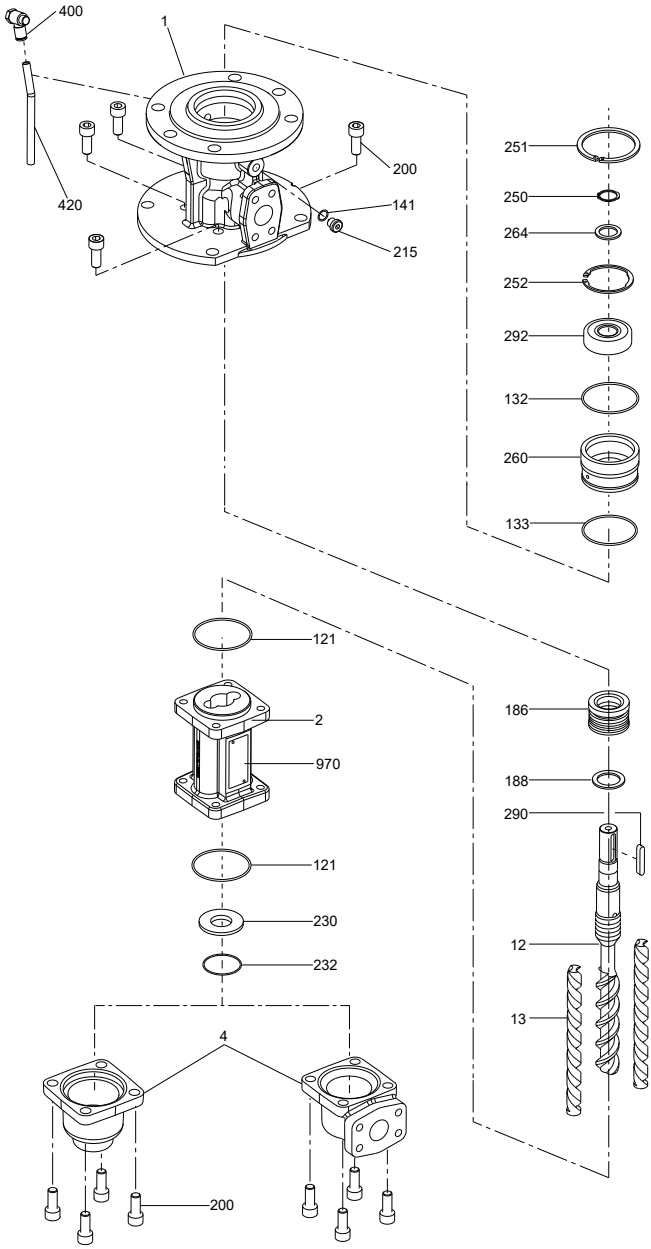
MTS model K exploded view



TM088285

China RoHS

1. 中国 RoHS

产品中有害物质的名称及含有信息表

部件名称	有害物质									
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr6+)	多溴联苯 (PBBs)	多溴二苯醚 (PBDEs)	邻苯二甲酸二正丁酯（DBP）	邻苯二甲酸二异丁酯 (DIBP)	邻苯二甲酸丁基苄酯（BBP）	邻苯二甲酸二（2-乙基）己酯（DEHP）
泵壳	X	O	O	O	O	O	O	O	O	O
紧固件	X	O	O	O	O	O	O	O	O	O
管件	X	O	O	O	O	O	O	O	O	O
定子	X	O	O	O	O	O	O	O	O	O
转子	X	O	O	O	O	O	O	O	O	O

注 1：O：表示该有害物质在该部件所有均质材料中的含量均不超出电器电子产品有害物质限制使用国家标准要求。
X：表示该有害物质至少在该部件的某一均质材料中含量超出电器电子产品有害物质限制使用国家标准要求。
注 2：以上未列出的部件，表明其有害物质含量均不超出电器电子产品有害物质限制使用国家标准要求。

TM090584

Appendix B

B.1. Japanese warranty statement

保　証

納入品の保証期間は、納入日より１ヶ年といたします。ただし、保証は日本国内で使用される場合に限ります。

保証期間中に本取扱説明書に従った製品仕様範囲内の正常な使用状態で故障を生じた場合は、故障部分の交換又は修理を無償で行います。この場合、無償交換、修理は、納入品の故障、破損部分の交換又は修理に限られ、その他の費用の負担、損害についての責任は免除させていただきます。

但し、次に該当する場合は、この保証の範囲から除外させていただきます。
（１） 不適当な取り扱い、使用、ならびに保存により生じた故障、破損
（２） 納入品以外の機器が原因による故障、破損
（３） 当社以外の修理、改造による故障、破損
（４） 当社指定品以外の部品を使用した場合の故障、破損
（５） 火災、地震、天災などの災害および不可抗力による故障、破損

修　理　・　ア　フ　タ　ー　サ　ー　ビ　ス

納入品に故障があることを発見したときは、直ちに購入先または弊社サービスまでご連絡下さい。
納入日より１ヶ年以内にご連絡がない場合は、故障、破損部分の交換又は修理は有償となります。
また、いかなる場合においても、その他の費用の負担、損害についての責任は免除させていただきます。

故障の連絡の際、銘板記載事項（型式、製造番号など）と故障状況をお知らせください。

EU declaration of conformity

GB: EU declaration of conformity

For products with CE marking on the nameplate.

We, Grundfos, declare under our sole responsibility that products (1) declared below are in conformity with the relevant union harmonisation legislation (2), harmonised standards or other technical specifications (3).

This declaration of conformity refers to the Grundfos document: 96496966, 96440790, 96496967, 98189180, 93225743, 93544337

CN:欧盟符合性声明

对于铭牌上带有 CE 标识的产品。

格兰富公司郑重宣布，以下声明的产品 (1) 符合欧盟统一的立法 (2)、协调标准或其他技术规格 (3)。

本符合性声明是指格兰富文档： 96496966, 96440790, 96496967, 98189180, 93225743, 93544337

JP:EU 適合宣言

銘板に CE マークが付いている製品用です。

グルンドフォスは、以下に宣言する製品(1)が、関連する組合整合法(2)、整合規格またはその他の技術仕様(3)に適合していることを唯一の責任において宣言します。

この適合宣言は、グルンドフォスの文書「に減給しています。96496966, 96440790, 96496967, 98189180, 93225743, 93544337

KO: EU 적합성 선언

명판에 CE 마크가 있는 제품의 경우.

Grundfos는 아래의 선언과 관련된 (1) 제품이 관련 Union 조화 규정(2), 조화 표준 및 기타 기술 규격(3)을 준수함을 단독 책임 하에 선언합니다.

이 적합성 선언은 다음의 Grundfos 문서를 참조합니다: 96496966, 96440790, 96496967, 98189180, 93225743, 93544337

TW：EU 合格聲明

針對在銘牌上有 CE 標示的產品。

葛蘭富根據我們唯一的責任，茲聲明與以下聲明相關之產品 (1) 符合相關的工會協調立法；(2) 協調標準；或 (3) 其他技術規範。

本合格聲明參考葛蘭富文件： 96496966, 96440790, 96496967, 98189180, 93225743, 93544337

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MTR, SPK, MTH, MTC, MTS (1)

Union harmonisation legislation (2)

Harmonised standards or other technical specifications (3)

- **Machinery Directive (2006/42/EC)**
  Standards used: EN 809:1998+A1:2009/AC:2010
- **EcoDesign Directive 2009/125/EC**
  (EU) No 547/2012
  Standard used: EN 16480:2021
- **RoHS Directives: (2011/65/EU and 2015/863/EU)**
  Standard used: EN IEC 63000:2018

Bjerringbro, 1 May 2026

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UK declaration of conformity

UK declaration of conformity

We, Grundfos, declare under our sole responsibility that the products to which the declaration below relates, are in conformity with UK regulations, standards and specifications to which conformity is declared, as listed below:

Valid for Grundfos products:

MTR, SPK, MTH, MTC, MTS

- Supply of Machinery (Safety) Regulations 2008

  Standards used: EN 809:1998, A1:2009.
- The Ecodesign for Energy-Related Products and Energy Information Regulations 2021 and 2019
- The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2019

  Standards used: EN IEC 63000:2018

This UK declaration of conformity is only valid when accompanying Grundfos instructions.

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Bjerringbro, 1 April 2026

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