

Original-Betriebsanleitung

EN - Original-Instruction Manual

(C)MXS ... -P

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(C)V(X)... -P

(C)K(X)... -P



HOMA
PUMPEN MIT SYSTEM

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1. General Information

1.1. Declaration of Conformity

EC Declaration of conformity in line with the EC Machinery Directive 2006/42/EEC, Appendix II Part 1 A

Manufacturer Name and Address:

HOMA Pumpenfabrik GmbH
Industriestraße 1
53819 Neunkirchen – Seelscheid
Germany

We hereby declare, that

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are conform to the following relevant requirements:

Machinery Directive 2006/42/EC

Applied harmonized standards of which have been published in the official Journal of the EC

Responsible for compiling the technical documentation:

Vassilios Petridis
Director Research and Development / Production
HOMA Pumpenfabrik GmbH

This Declaration of Conformity was issued by:

Oberheister, 23.02.2016



Vassilios Petridis
Director Research and Development / Production
HOMA Pumpenfabrik GmbH

1.2. Preface

Dear Customer,

Thank you for choosing one of our company's products. You have purchased a product which has been manufactured to the latest technical standards. Read this operating and maintenance manual carefully before you first use it. This is the only way to ensure that the product is safely and economically used.

The documentation contains all the necessary specifications for the product, allowing you to use it properly. In addition, you will also find information on how to recognize potential dangers, reduce repair costs and downtime, and increase the reliability and working life of the product.

All safety requirements and specific manufacturer's requirements must be fulfilled before the product is put into operation. This operating and maintenance manual supplements any existing national regulations on industrial safety and accident prevention. This manual must also be accessible to personnel at all times and also be made available where the product is used.

1.3. Proper use

The HOMA products comply with the valid safety regulations and meet the demands of state-of-the-art technology. In the event of improper use, there is a danger to life for the user as well as for third parties. Moreover, the product and/or attachments may be damaged or destroyed.

It is important to ensure that the product is only operated in technically perfect condition and as intended. To do so, follow the operating instructions.

The pumps can be used in the range specified by us at any time, in accordance with the current HOP.SEL version. We have selected the pump based on the data available to us. Please note that the offered pumps may only be used in the defined field of application. Operating the pump outside the range of application can lead to operational problems or significant damage to the unit. Particularly with long pipes, it may be necessary to start the pump slowly via a frequency converter to slowly speed up the mass at rest. This is the only way to ensure that the operation of the pump above the operating limit can be reliably ruled out. To select the frequency, we recommend our leaflet „Frequency Converter“.

1.4. Copyright

This operation and maintenance manual has been copyrighted by the manufacturer. This operation and maintenance handbook is intended for the use by assembly, operating and maintenance personnel. It contains technical specifications and diagrams which may not be reproduced or distributed, either completely or in part, or used for any other purpose without the expressed consent of the manufacturer.

1.5. Warranty

Costs for removal and installation of the complained product at the installation place, costs for the ride of the mechanics to the location and from the installation place and costs for transport are not components of our warranty.

Hereby arose costs, especially costs for checking and transport are bearing by the sender or operator of the pump. This is also valid for an asserted warranty claim if a check results that the unit works faultless and is free of defects. All products have a high quality standard. Each product is defeated by a strict technical end control before delivery. A warranty repair achieved by us does not extend the warranty period. Replaced spare parts give no reasons for a new warranty period. Extensive claims are excluded, especially such as diminution, change or compensation also for any kind of follow up damages.

In order to ensure that your guarantee claim is processed as efficiently as possible, please contact us or the appropriate sales representative. Once your claim for a return has been agreed, you will receive a return certificate. Please then send the rejected product, carriage prepaid, to the factory together with the return certificate, proof of purchase and an indication of the damage. Claims made on grounds of damage caused in transit must be established and confirmed on delivery of the product by the express company, the railway company or the postal service.

1.5.1. General information

This chapter contains the general information on the warranty. Contractual agreements have the highest priority and are not superseded by the information in this chapter!

The manufacturer is obliged to correct any defects found in the products it sells, provided that the following requirements have been fulfilled:

- The defects are caused by the materials used or the way the product was manufactured or designed.
- The defects were reported in writing to the manufacturer within the agreed warranty period.
- The product was used only as prescribed.
- All safety and control devices were connected and inspected by authorized personnel.

If no other provisions have been made, the warranty period applies to the first 12 months after initial start-up or to a max. of 24 months after the delivery date. Other agreements must be made in writing in the order confirmation. These agreements will remain valid at least until the agreed warranty period of the product has expired.

1.5.2. Spare parts, add-ons and conversions

Only original spare parts as supplied by the manufacturer may be used for repairs, replacements, add-ons and conversions. Only these parts guarantee a long working life and the highest level of safety. These parts have been specially designed for our products. Self-made add-ons and conversions or the use of non-original spare parts can seriously damage the product and/or injure personnel.

1.5.3. Maintenance

The prescribed maintenance and inspection work should be carried out regularly. This work may only be carried out by qualified, trained and authorized personnel. The maintenance and inspection log supplied must be properly updated. This enables you to monitor the status of inspections and maintenance work. Quick repairs not listed in this operation and maintenance manual and all types of repair work may only be performed by the manufacturer and its authorized service centres.

1.5.4. Damage to the product

Damage as well as malfunctions that endanger safety must be eliminated immediately by authorized personnel. The product should only be operated if it is in proper working order. During the agreed warranty period, the product may only be repaired by the manufacturer or an authorized service workshop! The manufacturer reserves the right to recall the damaged product to the factory for inspection!

1.5.5. Exclusion from liability

No liability will be assumed for product damage if one or more of the following points apply:

- Incorrect design on our part due to faulty and/or incorrect information provided by the operator or customer
- Non-compliance with the safety instructions, the regulations and the requirements set forth by German law and this operating and maintenance manual
- Incorrect storage and transport
- Improper assembly/dismantling
- Improper maintenance
- Unqualified repairs
- Faulty construction site and/or construction work
- Chemical, electrochemical and electrical influences
- Wear

In case of a power failure or another technical failure, by which a proper operation of the pump is no longer guaranteed, it is essential to take care that damages by an overflow of the pump sump are prevented securely, for example, by installing a mains-independent alarm or other appropriate protective measures.

This means the manufacturer's liability excludes all liability for personal, material or financial injury.

1.5.6. Manufacturer's address

HOMA Pumpenfabrik GmbH
Industriestrasse 1
D-53819 Neunkirchen-Seelscheid
Phone: +49 2247 / 7020
Fax: +49 2247 / 70244
Email: info@homa-pumpen.de
Homepage: www.homapumpen.de

1.6. Technical terms

Various technical terms are used in this operating and maintenance manual.

Dry run

The product is running at full speed, however, there is no liquid to be pumped. A dry run is to be strictly avoided. If necessary, a safety device must be installed.

“wet” installation type

This installation type requires the product to be immersed in the pumped fluid. It is completely surrounded by the pumped fluid. Please observe the values for the maximum submersion depth and the minimum water coverage.

“dry” installation type

In this installation type, the product is installed dry, i.e. the pumped fluid is delivered to and discharged via a pipeline system. The product is not immersed in the pumped fluid. Please note that the surfaces of the product become very hot!

“transportable” installation type

With this installation type the product is equipped with a pedestal. It can be installed and operated at any location. Please observe the values for the maximum submersion depth and the minimum water coverage, and remember that the surfaces of the product become very hot.

“S1” operating mode (continuous operation)

At the rated load, a constant temperature is reached that does not increase even in prolonged operation. The operating equipment can operate uninterruptedly at the rated load without exceeding the maximum permissible temperature.

“S2” operating mode (short-term operation)

The operating time is specified in minutes, for example, S2-20. That means, that the machine can work 20 minutes and should pause after it, as long as the machine is cooled down to 2K over medium temperature.

Operating mode „S3“ (intermittent operation):

For these operating modes, after the abbreviation, the duty cycle is displayed as well as the cycle duration if it deviates from 10 minutes. Example S3 30% means, that the machine can work 3 minutes and afterwards should pause 7 minutes.

“Sip operation”

Siphoning operation is similar to dry running. The product operates at full speed, but only small amounts of liquid are pumped.

Sip operation is only possible with certain types; see the “Product description” chapter.

Dry-run protection

The dry-run protection is designed to automatically shut down the product if the water level falls below the minimum water coverage value of the product. This is made possible by installing a float switch.

Level control

The level control is designed to switch the product on or off depending on the filling level. This is made possible by installing a float switch.

2. Safety

This chapter lists all the generally applicable safety instructions and technical information. Furthermore, every other chapter contains specific safety instructions and technical information. All instructions and information must be observed and followed during the various phases of the product's lifecycle (installation, operation, maintenance, transport etc.). The operator is responsible for ensuring that personnel follow these instructions and guidelines.

2.1. Instructions and safety information

This manual uses instructions and safety information for preventing injury and damage to property.

To make this clear for the personnel, the instructions and safety information are distinguished as follows:

Each safety instruction begins with one of the following signal words:

Danger: Serious or fatal injuries can occur!

Warning: Serious injuries can occur!

Caution: Injuries can occur!

Caution (Instruction without symbol): Serious damage to property can occur, including irreparable damage!

Safety instructions begin with a signal word and description of the hazard, followed by the hazard source and potential consequences, and end with information on preventing it.

2.2. Guidelines used and CE certification

Our products are subject to

- various EC directives
- various harmonized standards
- various national standards.

Please consult the EU Declaration of Conformity for the precise information and the guidelines and norms in effect. The EU Declaration of Conformity is issued in accordance with EU Directive 2006/42/EEC, Appendix II A. Also, various national standards are also used as a basis for using, assembling and dismantling the product. These include the German accident prevention regulations, VDE regulations, German Equipment Safety Law etc. The CE symbol is found either on the type plate or next to the type plate. The type plate is attached to the motor casing.

2.3. General safety

- Never work alone when installing or removing the product.
- The machine must always be switched off before any work is performed on it (assembly, dismantling, maintenance, installation). The machine must be disconnected from the electrical system and secured against being switched on again. All rotating parts must be at a standstill.
- The operator should inform his/her superior immediately should any defects or irregularities occur.
- It is of vital importance that the system is shut down immediately by the operator if any problems arise which may endanger safety of personnel. Problems of this kind include:

- Failure of the safety and/or control devices
- Damage to critical parts
- Damage to electric installations, cables and insulation.
- Tools and other objects should be kept in a place reserved for them so that they can be found quickly.
- Sufficient ventilation must be provided in enclosed rooms.
- When welding or working with electronic devices, ensure that there is no danger of explosion.
- Only use fastening devices which are legally defined as such and officially approved.
- The fastening devices should be suitable for the conditions of use (weather, hooking system, load, etc). If these are separated from the machine after use, they should be expressly marked as fastening devices. Otherwise they should be carefully stored.
- Mobile working equipment for lifting loads should be used in a manner that ensures the stability of the working apparatus during operation.
- When using mobile working equipment for lifting non guided loads, measures should be taken to avoid tipping and sliding etc.
- Measures should be taken that no person is ever directly beneath a suspended load. Furthermore, it is also prohibited to move suspended loads over workplaces where people are present.
- If mobile working equipment is used for lifting loads, a second person should be present to coordinate the procedure if needed (for example if the operator's field of vision is blocked).
- The load to be lifted must be transported in such a manner that nobody can be injured in the case of a power cut. Additionally, when working outdoors, such procedures must be interrupted immediately if weather conditions worsen.



These instructions must be strictly observed. Non-observance can result in injury or serious damage to property.

2.4. Operating personal

All personnel who work on or with the product must be qualified for such work; electrical work, for example may only be carried out by a qualified electrician. The entire personnel must be of age. Operating and maintenance personnel must also work according to local accident prevention regulations. It must be ensured that personnel have read and understood the instructions in this operating and maintenance handbook; if necessary this manual must be ordered from the manufacturer in the required language.

2.5. Electrical work

Our electrical products are operated with alternating or industrial high-voltage current. The local regulations (e.g. VDE 0100) must be adhered to. The "Electrical connection" data sheet must be observed when connecting the product. The technical specifications must be strictly adhered to. If the machine has been switched off by a protective device, it must not be switched on again until the error has been corrected.



Beware of electrical current!
Incorrectly performed electrical work can result in fatal injury! This work may only be carried out by a qualified electrician.



Beware of damp!
Moisture penetrating cables can damage them and render them useless. Furthermore, water can penetrate into the terminal compartment or motor and cause damage to the terminals or the winding. Never immerse cable ends in the pumped fluid or other liquids.

2.5.1. Electrical connection

When the machine is connected to the electrical control panel, especially when electronic devices such as soft startup control or frequency drives are used, the relay manufacturer's specifications must be followed in order to conform to EMC. Special separate shielding measures e.g. special cables may be necessary for the power supply and control cables.

The connections may only be made if the relays meet the harmonized EU standards. Mobile radio equipment may cause malfunctions.



Beware of electromagnetic radiation!
Electromagnetic radiation can pose a fatal risk for people with pacemakers. Put up appropriate signs and make sure anyone affected is aware of the danger.

2.5.2. Ground connection

Our products (machine including protective devices and operating position, auxiliary hoisting gear) must always be grounded. If there is a possibility that people can come into contact with the machine and the pumped liquid (e.g. at construction sites), the grounded connection must be additionally equipped with a fault current protection device. The electrical motors conform to motor protection class IP 68 in accordance with the valid norms.

2.6. Operating procedure

When operating the product, always follow the locally applicable laws and regulations for work safety, accident prevention and handling electrical machinery. To help to ensure safe working practice, the responsibilities of employees should be clearly set out by the owner. All personnel are responsible for ensuring that regulations are observed. Certain parts such as the rotor and propeller rotate during operation in order to pump the fluid. Certain materials can cause very sharp edges on these parts.



Beware of rotating parts!
The moving parts can crush and sever limbs. Never reach into the pump unit or the moving parts during operation. Switch off the machine and let the moving parts come to a rest before maintenance or repair work!

2.7. Safety and control devices

Our products are equipped with various safety and control devices. These include, for example suction strainers, thermo sensors, sealed room monitor etc. These devices must never be dismantled or disabled. Equipment such as thermo sensors, float switches, etc. must be checked by an electrician for proper functioning before start-up (see the "Electrical Connection" data sheet). Please remember that certain equipment requires a decoder device or relay to function properly, e.g. posistor and PT100 sensor. This decoder can be obtained from the manufacturer or a specialist electronics dealer.

Personnel must be informed of the installations used and how they work.



Caution!

Never operate the machine if the safety and monitoring devices have been removed or damaged, or if they do not work.

2.8. Operation in an explosive atmosphere

Products marked as explosion-proof are suitable for operation in an explosive atmosphere. The products must meet certain guidelines for this type of use. Certain rules of conduct and guidelines must be adhered to by the operator as well. Products that have been approved for operation in an explosive atmosphere are marked as explosion-protected "Ex". In addition, an "Ex" symbol must be included on the type plate! When used in an explosive atmosphere, the additional chapter entitled "Explosion protection according to the ...standard" must be observed!

2.9. Sound pressure

Depending on the size and capacity (kW), the products produce a sound pressure of approximately 60 dB (A) and 110 dB (A). The actual sound pressure, however, depends on several factors. These include, for example, the installation type (wet, dry, transportable), fastening of accessories (e.g. suspension unit) and pipeline, operating site, immersion depth, etc. Once the product has been installed, we recommend that the operator make additional measurements under all operating conditions.



Caution: Wear ear protectors!

In accordance with the laws in effect, guidelines, standards and regulations, ear protection must be worn if the sound pressure is greater than 85 dB (A)! The operator is responsible for ensuring that this is observed!

2.10. Pumped fluids

Each pumped fluid differs in regard to composition, corrosiveness, abrasiveness, TS content and many other aspects. Generally, our products can be used for many applications. For more precise details, see chapter 3, the machine data sheet and the order confirmation. It should be remembered that if the density, viscosity or the general composition change, this can also alter many parameters of the product. Different materials and impeller shapes are required for different pumped fluids. The more exact your specifications on your order, the more exactly we can modify our product to meet your requirements.

If the area of application and/or the pumped fluid change, we will be happy to offer supportive advice.

When switching the product into another pumped fluid, observe the following points:

- Products which have been operated in sewage or waste water must be thoroughly cleaned with pure water or drinking water before use.
- Products which have pumped fluids which are hazardous to health must always be decontaminated before changing to a new fluid. Also clarify whether the product may be used in a different pumped fluid.
- With products which have been operated with a lubricant or cooling fluid (such as oil), this can escape into the pumped fluid if the mechanical shaft seal is defective.



Danger - explosive fluids!

It is absolutely prohibited to pump explosive liquids (e.g. gasoline, kerosene, etc.). The products are not designed for these liquids!

3. General description

3.1. Application

Pump is suitable for pumping sewage, effluents, sludge and surface water. The pumps are used for installations in public and private sector, trade and industry. The pumps can convey abrasive medium as surface water. For highly abrasive content, such as concrete-gravel and sand in the medium, it is necessary to protect the impeller and pump housing against excessive abrasion or to shorten the maintenance interval.

Before the pumping of chemically aggressive liquids, the resistance of the pump materials must be checked. The pumps are available in high quality materials of all components (Stainless steel, bronze).

Use in sip operation is not permitted. According to the type of installation and motor cooling, the machine must be submerged in pumped liquid at least up to the top edge of the pump or motor housing. The motor housing must always be completely submerged for wet installation without a water jacket.

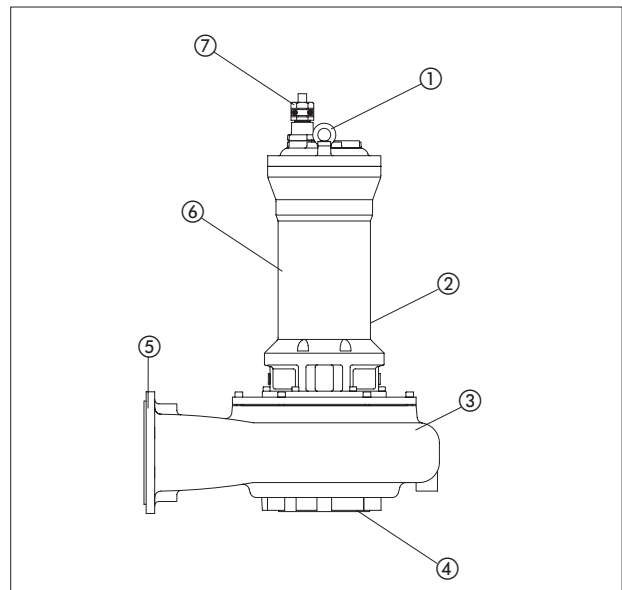
The temperature of the conveyed medium may be up to 40 °C, or up to 60 °C for a short period. The maximum density of the medium is 1040 kg/m³ and the pH may be from 6 – 11. However, the pH alone only serves as a guideline. In any case, alongside the composition of the medium, the durability of the pump must be requested from the manufacturer. Depending on the composition, it may be necessary to use special sealing materials.

3.2. Types of use

The motors are designed for continuous operation (S1), maximum 15 starts per hour. The hydraulic is designed for permanent operation, e.g. supply of industrial water.

3.3. Construction

The pump consists of the motor and the pump housing as well as the impeller which belongs to it. All important parts of the pump are characterized by generous dimensioning.



No.	Description
1	Ear for sling gear
2	Type label
3	Pump housing
4	Suction inlet
5	Discharge
6	Motor housing
7	Cable entry

3.3.1. Type label

3Ph

HOMA		Homa Pumpenfabrik GmbH D-53819 N.-Seelscheid Germany	
Type: ①	Sn: ②		
Impϕ: ③ mm	Tmax: ④ °C	Δ ⑤ m	⑥ kg
Hmax: ⑦ m	Hmin: ⑧ m	Qmax: ⑨ m ³ /h	
⑩	CE ⑪	⑫a ⑫b	Bj ⑬
Motor: ⑭	⑮		
⑯ Hz 3~ U:	⑰ V Δ	I:	⑱ A
⑲ min ⁻¹ U:	⑳ V Y	I:	㉑ A
Isol.Kl.: ㉒	P1: ㉓ kW	Cos ϕ: ㉔	
㉕	P2: ㉖ kW	㉗	
⑳			㉘
Made in Germany			

3Ph Ex

HOMA		Homa Pumpenfabrik GmbH D-53819 N.-Seelscheid Germany	
Type: ①	Sn: ②		
Impϕ: ③ mm	Tmax: ④ °C	Δ ⑤ m	⑥ kg
Hmax: ⑦ m	Hmin: ⑧ m	Qmax: ⑨ m ³ /h	
⑩	CE ⑪	⑫a ⑫b	Bj ⑬
Motor: ⑭	⑮		
⑯ Hz 3~ U:	⑰ V Δ	I:	⑱ A
⑲ min ⁻¹ U:	⑳ V Y	I:	㉑ A
Isol.Kl.: ㉒	P1: ㉓ kW	Cos ϕ: ㉔	
㉕	P2: ㉖ kW	㉗	
㉘			㉙
Do not open when non-intrinsically safe circuits are energized			
Made in Germany			

3.3.2. Motor

The three-phase asynchronous motor is made from sheet metal with a double-varnished winding wire as well as the motor shaft with rotor package. The power supply cable is designed for the maximum mechanical load and is sealed against water pressure from the pumped liquid. The motor cable lead connections are sealed from the pumped liquid as well. The bearings used are permanently lubricated maintenance-free antifriction bearings.

All models are available with explosion proof motors according to ATEX Ex II 2 G EExd.

General motor data	
Service factor	1.15
Operating mode	S1
Insulation class	H (180°C)
Degree of protection	IP68
Cable length	10 m
Rotor shaft seal	Silicon-carbide / Silicon-carbide
Mechanical shaft seal	Silicon-carbide / Silicon-carbide
Bearing	One grooved ball bearing (above), double-row type angular ball bearing (below)

3.3.3. Monitoring Equipment

The unit is equipped with various pieces of monitoring and safety equipment. The following table shows an overview of the options available. Options may vary, depending on the size of the pressure joint.

Motor type	Motor version
P...	Temperature monitoring in the winding (only 50Hz)
P.../C	Temperature monitoring in the winding, Oil chamber seal conditions sensor
PU...	Fully submerged motor, Temperature monitoring in the winding, Oil chamber seal conditions sensor
PL...	Fully submerged motor, closed liquid cooling, Temperature monitoring in the winding, Seal probe leakage chamber
P...EX	Temperature monitoring in the winding, Explosion proof (only 50Hz)
P.../C EX	Temperature monitoring in the winding, Oil chamber seal conditions sensor and motor connecting chamber, Explosion proof
PU... EX	Fully submerged motor, Temperature monitoring in the winding, Oil chamber seal conditions sensor, Explosion proof
PL...EX	Fully submerged motor, closed liquid cooling, Temperature monitoring in the winding, Seal probe leakage chamber, Explosion proof

Temperature Sensors

The pumps have a set of temperature sensors built in the stator windings. The contact of these sensors opens in case of overtemperature and switches off the motor power supply.

Standard models have the sensors connected to the motor power supply cable the wire ends marked T1 and T3. They must be connected to the safety circuit of the control box in order to provide an automatic re-start of the motor, when the motor cools.

Explosion proof models with motors have a set of temperature sensors built-in, with a higher switch-off temperature, connected to the motor cable the wire ends marked T1 and T2. They must be connected to a special relay in the starter box in order to switch it off when it is overheated.

Switch-off temperature of the sensors:

Motor	Stator winding Normal T1+T3 Regulator	Stator winding Ex T1+T2 Limiter	Lower bearing
AM204...P-2pol	150°C	150°C	90°C
AM204...P-4pol	150°C	140°C	80°C
AM204...P-6pol	150°C	150°C	80°C

Direction of Rotation Check

All pumps have the correct direction of rotation when connecting to a dextrorotatory field (U, V, W -> L1, L2, L3). HOMA switching devices check the mains for a dextrorotatory field. If there is no dextrorotatory field, the red LED lights up. Two phases are to be swapped at the input of the switching device. For smaller pumps, the check can be done by monitoring the starting jolt. Do do this, put the pump carefully on the floor on its edge and switch on briefly. Seen from above, the pump slightly jolts in the correct anticlockwise direction.

The pump has the correct direction of rotation if the pump moves anticlockwise, as the motor starts in the clockwise direction when seen from above.



For large pumps, the direction of rotation can also be detected by looking through the pressure joint into the pump chamber. Here you will see the impeller and by briefly switching on, check the direction of rotation by the coasting of the impeller.



Beware of rotating impeller! The moving impeller can crush and sever limbs. Never reach into the pump unit or the moving parts during operation. Switch off the machine and let the moving parts come to a rest before maintenance or repair work!

It is also possible to check the direction of rotation with a "Motor and Phase Rotation Indicator". This measuring device is held on the outside of the motor housing when the pump is switched on and indicates the direction of rotation with an LED.

Seal condition sensors at pumps with oil chamber

- Models without cooling jacket or model „U“ with cooling jacket and open circuit cooling:

In case of water entering the oil chamber through the shaft seals, the resistance will change. The electrical resistance of the oil in the oil chamber is measured by 2 sensors. The sensors must be connected by 2 wires (marked S1 and S2) of the pump connecting cable in the control panel with a tripping unit with galvanically separated safety circuit (electrode relay, e.g. HOMA part no.: 1610995). For explosion-proof models an intrinsically-safe relay (HOMA part no.: 1416510) must be used. The tripping unit should have an adjustable sensitivity of 0 to 100 k Ω , standard setting is approx. 50 k Ω .

Seal condition sensors at pumps without oil chamber

- Models with cooling jacket and closed (internal) cooling circuit (model „L“):

A leakage chamber is controlled by two sensors for entering of cooling liquid (liquid water/glycol). This leakage chamber is placed between the upper (motor-side) shaft seal and the bottom ball bearing. In case of cooling liquid entering the leakage chamber through the upper shaft seal, the sensors contact. The sensors must be connected by 2 wires (marked S11 and S12) of the pump connecting cable in the control panel with a tripping unit with galvanically separated safety circuit (electrode relay, e.g. HOMA part no.: 1610995).

For explosion-proof models an intrinsically-safe relay (HOMA part no.: 1416510) must be used. The tripping unit should have an adjustable sensitivity of 0 to 100 k Ω , standard setting is approx. 50 k Ω . This sensor-alarm monitors a leakage affecting the stator room of the electric motor, which may result in a motor shortcut. Therefore the motor control panel should automatically switch off the motor, when this alarm appears.

Cable connection seal condition sensors

The cable connecting chamber is controlled by two sensors for entering of water.

The sensors must be connected by 2 wires (marked S2 and S3) of the pump connecting cable in the control panel with a tripping unit with galvanically separated safety circuit (electrode relay, e.g. HOMA part no.: 1610995).

For explosion-proof models an intrinsically-safe relay (HOMA part no.: 1416510) must be used.

Motor cooling

Motors for submerged operation are cooled by the surrounding liquid.

3.3.4. Sealing

The sealing between pump and motor is carried out by two separate mechanical shaft seals (silicon-carbide) in tandem-arrangement. It is made of bearing cover and pressure cover. It is filled with medical white oil. Separate large oil chamber, lubricating and cooling the mechanical seals, forming an extra safety and inspection element.

3.3.5. Pump housing

The pump housing, depending on the model, is supplied with different connections. This means that the machine can be connected with the respective pipe system. The pump housing is also available rubber-coated inside. Some pump housings are supplied with a cleaning hole lid to eliminate blockages. The pump can be equipped with a stationary wear ring which can be found in the intake port. This wear ring determines the gap between the impeller and the intake port. If this gap is too big, the performance of the pump decreases and it can lead to blockages. The rings can be changed to minimize wear and expenses for spare parts.

3.3.6. Impeller

The impeller is fastened directly to the motor shaft and driven by it. The impeller is also available in different materials (GG, GGG, VA, BZ) or coated with ceramic liquid. A range of different impeller designs are available:

M:	Enclosed single channel impeller, for liquids containing impurities and sludge with solid particles or long fibres.
K:	Enclosed multi channel impeller, for liquids containing impurities and sludge with solid particles.
V:	Vortex impeller, for liquids containing a high level of impurities or fibrous matter and containing gas.

4. Package, Transport, Storage

4.1. Delivery

On arrival, the delivered items must be inspected for damage and a check made that all parts are present. If any parts are damaged or missing, the transport company or the manufacturer must be informed on the day of delivery. Any claim made at a later date will be deemed invalid. Damage to parts must be noted on the delivery or freight documentation.

4.2. Transport

Only the appropriate and approved fastening devices, transportation means and lifting equipment may be used. These must have sufficient load bearing capacity to ensure that the product can be transported safely. If chains are used they must be secured against slipping. The personnel must be qualified for the tasks and must follow all applicable national safety regulations during the work.

The product is delivered by the manufacturer/shipping agency in suitable packaging. This normally precludes the possibility of damage occurring during transport and storage. The packaging should be stored in a safe place if the location used is changed frequently.

4.3. Storage

Newly supplied products are prepared that they can be stored for 1 year. The product should be cleaned thoroughly before interim storage. The following should be taken into consideration for storage:

- Place the product on a firm surface and secure it against falling over. Submersible mixers and auxiliary lifting devices should be stored horizontally, submersible sewage pumps and submersible motor pumps should be stored horizontally or vertically. It should be ensured that they cannot bend if stored horizontally.



Danger from falling over!

Never put down the product unsecured. If the product falls over, injury can occur!

- The product has to be stored at a place free from vibrations and agitation to avoid damage from the ball bearings.
- It is also necessary to pay attention to the storage. The device should be stored in dry rooms without temperature fluctuation.
- The product may not be stored in rooms where welding work is conducted as the resulting gases and radiation can damage the elastomer parts and coatings.
- It is responsible to take care that the corrosion coating will not be spoiled
- Any suction or pressure connections on products should be closed tightly before storage to prevent impurities.
- The power supply cables should be protected against kinking, damage and moisture.



Beware of electrical current!

Damaged power supply cables can cause fatal injury! Defective cables must be replaced by a qualified electrician immediately.



Beware of damp!

Moisture penetrating cables can damage them and render them useless. Therefore, never immerse cable ends in the pumped fluid or other liquids.

- The machine must be protected from direct sunlight, heat, dust, and frost. Heat and frost can cause considerable damage to propellers, rotors and coatings.
- The rotors or propellers must be turned at regular intervals. This prevents the bearing from locking and the film of lubricant on the mechanical shaft seal is renewed. This also prevents the gear pinions (if present on the product) from becoming fixed as they turn and also renews the lubricating film on the gear pinions (preventing rust film deposits).



Beware of sharp edges!

Sharp edges can form on rotors and propellers. There is a risk of injuries. Wear protective gloves.

- If the product has been stored for a long period of time it should be cleaned of impurities such as dust and oil deposits before start-up. Rotors and propellers should be checked for smooth running, housing coating and damage.
- After storage longer than one year the oil of motor and, if necessary the gear have to be changed. This is also necessary if the product never had run (natural deterioration of mineral oil).

Before start-up, the filling levels (oil, cooling fluid etc.) of the individual products should be checked and topped up if required. Please refer to the machine data sheet for specifications on filling. Damaged coatings should be repaired immediately. Only a coating that is completely intact fulfills the criteria for intended usage!

If these rules are observed, your product can be stored for a longer period. Please remember that elastomer parts and coatings become brittle naturally. If the product is to be stored for longer than 6 months, we recommend checking these parts and replacing them as necessary. Please consult the manufacturer.

4.4. Returning to the supplier

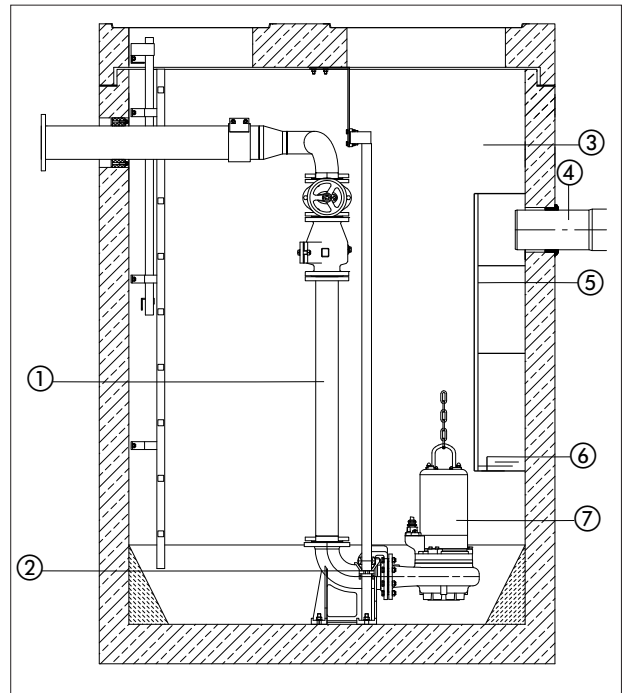
Products which are delivered to the plant must be clean and correctly packaged. In this context, clean means that impurities have been removed and decontaminated if it has been used with materials which are hazardous to health. The packaging must protect the product against damage. Please contact the manufacturer before returning!

5. Installation and initial commissioning

5.1. General

To avoid damage to the lifting unit during installation and operation, the following points must be observed:

- The installation work must be performed by qualified personnel, in compliance with safety regulations.
- The pump must be inspected for damage prior to installation.
- For level controls, pay attention to the minimum water coverage.
- Air bubbles in the pump housing and pipework must be avoided (by suitable ventilation devices or a slight incline of the pump).
- Protect the pump from frost.
- The operating room must be designed for the particular machine. This also means that a lifting device for assembly/disassembly can be mounted, from which the installation space of the pump can be reached without risk.
- The lifting device must have a maximum load capacity which is greater than the weight of the pump with attachments and cable.
- The power lines of the pump must be laid in such a way, that a safe operation and easy assembly/disassembly is ensured.
- The power lines must be fixed properly in the operating room to prevent the cable from hanging loosely. Depending on the cable length and weight, a cable holder must be attached every 2-3 m.
- The foundation/structure must have sufficient strength for secure and functionally correct fastening of the pump. The operator is responsible for this.
- A dry run is strictly prohibited. We recommend a level control for that.
- Use baffles for the inlet. This prevents air entry into the pumping medium, which can lead to unfavorable operating conditions and result in increased wear.



No.	Description
1	Pipe
2	Coupling system
3	Service room
4	Inlet
5	Baffle plate
6	min. liquid level
7	Pump

5.2. Installation



Risk of falling!

When installing the pump and accessories, work is carried out directly on the water's edge! Carelessness or wearing the wrong shoes can lead to falling. This is life threatening! Take all safety precautions to prevent this.

Submerged installation on ground support ring

Attach the ground support ring (available as an accessory) with screws to the pump suction nozzle. 90° connection-elbow or connection loop to the pressure port of the pump, mount pressure line. Gate valves and check valves may need to be installed in accordance with local regulations. The pressure line must be fitted free of tension, when using a hose, ensure it is laid kink-free.

Secure the pump by the handle with a cable or chain, and lower it into the pumping medium. In muddy ground, put stones under the pump to prevent it from sinking.

Wet installation with automatic coupling system

The following instructions apply to the installation of the original HOMA-coupling system:

- Determine the approximate position of the coupling base and the upper pipe bracket for the guide tubes, using a plumb bob where necessary.

- Check the correct installation dimensions of the pump(s) (see dimensional drawings in the appendix).
- Drill mounting holes for the pipe bracket on the inside edge of the shaft opening. If this is not possible due to the space available, the pipe bracket can also be mounted in an offset position with a 90° folded plate on the underside of the shaft cover. Provisionally fasten the pipe bracket with 2 screws.
- Align the coupling base to the shaft floor, use a plumb bob from the pipe bracket - the guide tubes must be exactly perpendicular! Fasten the coupling base to the shaft floor with heavy-duty dowels. Ensure that the coupling base is exactly horizontal! If the shaft floor is uneven, support the bearing surface accordingly.
- Mount the pressure pipes with fittings free of tension according to the usual mounting principles.
- Insert both guide tubes into the eyelets on the coupling base and cut to size according to the position of the pipe bracket. Unscrew the pipe bracket, insert the tabs into the guide tubes and fasten the bracket completely. The guide tubes must be positioned with no play at all, otherwise loud noises will occur during operation of the pump.
- Clean the shaft of any solid material (debris, stones, etc.) before commissioning.
- Mount the coupling counterflange of the automatic coupling system on the pump pressure ports (thread or flange connection). Ensure that the rubber seal is firmly seated in position in the counterflange (as a seal against the coupling base), so that it will not fall out when lowering the pump.
- Attach the chain to the pump handle or lifting lugs. Insert the pump with the guide claws of the coupling counterflange between the guide tubes in the shaft. Lower the pump into the shaft. If the pump is seated on the coupling base, it automatically seals itself off to the pressure line and is ready for operation.
- Hang the end of the discharge chain from a hook at the shaft opening.
- Hang the motor connection cable of the pump in the shaft at an appropriate length, with strain relief. Make sure that the cables can not be bent or damaged.

Dry Installation

For the installation of the pump outside of the collecting duct, a feed line to the pump housing inlet must be connected. For dry installation, only the models with a motor cooling jacket are suitable.

The installation of the pump can be either vertical or horizontal.

- Attach the pump stand or support feet to the pump.
- Mark the position of the pump on the ground, drill and anchor pump with heavy-duty dowels.
- Use the fittings to mount the suction and pressure pipes free of tension according to the usual mounting principles.



Pumps with cooling jackets must be vented! The screw plug 903.02 must be released. After ventilation, the screw plug must be tightened again.



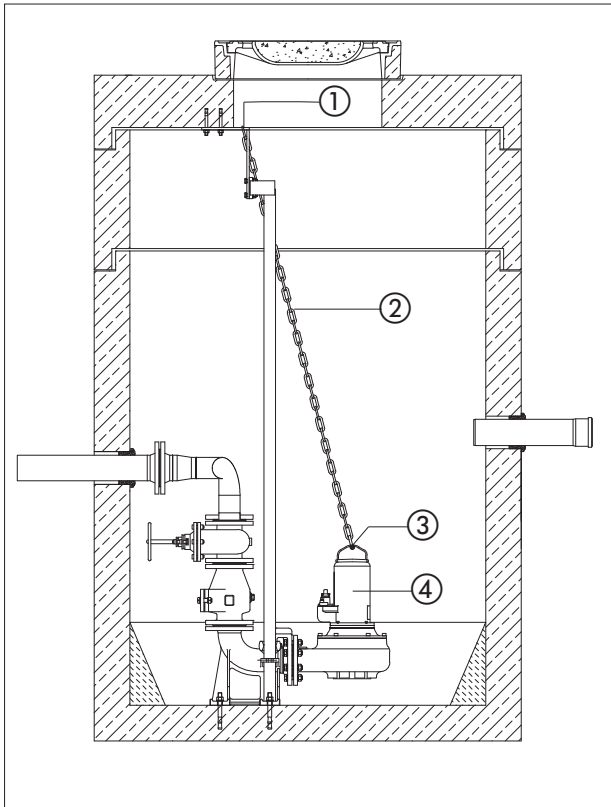
5.3. Use of chains

Chains are used to lower a pump in the operating space or to pull it out.

They are not intended to secure a floating pump. Intended use is as follows:

- Fasten one end of the chain on the handle of the pump provided for this purpose. If your pump has two ring bolts as an attachment point, you must use a double-strand chain. When doing so, the angle of inclination of the chain strands must be between 0° and 45°.
- Attach the other end to the lifting device.
- Ensure tension on the chain, and then lift the pump in a slow and controlled manner.
- Swing the pump then over the operating space and lower it gently. When using a suspension unit, observe chapter 5. Commissioning.
- Lower the pump to the operating point from and make sure that the pump has a secure footing or the coupling system is engaged correctly.
- Remove the chain from the lifting device and secure it to the safety chain, which is located at the top of the operating room. This ensures that the chain can not fall into the operating area and constitutes a danger to anyone.

Please note the following diagrams during installation.



No.	Description
1	Chain guard
2	Chain
3	Handle
4	Pump

5.4. Initial operation

This chapter contains all the important instructions for operating personnel for the safe commissioning and operation of the machine.

The following information must be strictly adhered to and checked:

- Type of installation
- Operating mode
- Minimum/max water coverage. Immersion depth

After a long downtime, these specifications are also to be checked and any defects are to be rectified!

The operation and maintenance manual must always be kept with the machine, or be kept in a designated place where it is always accessible for all of the operating personnel.

To avoid injury to persons or damage during operation of the machine, the following points must be observed:

- The initial operation may only be carried out by qualified and trained personnel following the safety instructions.
- All staff working on the machine must receive, read, and understand the instructions.

- Activate all safety devices and emergency stop switches before initial operation.
- Electrical and mechanical adjustments may only be performed by professionals.
- This machine is only suitable for use at the specified operating conditions.

5.5. Preparatory work

The machine has been using state of the art technology and has been constructed so that it will operate reliably and for long periods under normal operating conditions. This requires, however, that you comply with all advice and instructions. Small oil leaks from the mechanical seal during operation are harmless, however, must be removed before lowering or immersion into the pumping medium.

Please check the following points:

- Cable routing - no loops, slightly taut
- Liquid temperature and immersion depth check - see machine data sheet
- If a hose is used on the discharge side, it should be flushed before use with fresh water so that no deposits cause blockages
- For wet installation, the sump pump must be cleaned
- The pressure and suction side pipe systems are to be clean and all slides are to be opened.
- The pump casing must be flooded, i.e. it must be completely filled with the medium and there may be no more air in it. The venting can be done by suitable ventilation devices in the system, or, if available, by venting screws at the outlet nozzle.
- Check the accessories, pipe system and suspension unit for firm and correct fit
- Review the present level control or dry run protection
- An insulation test and a level control must be carried out before commissioning.

5.6. Electrical

When installing and selection of electric lines and when connecting the motor, the relevant local and VDE regulations must be observed. The motor must be protected by a motor protection circuit breaker. Connect the motor connect as per the wiring diagram. Pay attention to the direction of rotation! If rotation is in the wrong direction, the machine will perform to specifications, and can be damaged under adverse circumstances.

Check the operating voltage, and ensure there is uniform power consumption by all phases in accordance with the machine data sheet. Make sure that all temperature sensors and monitoring devices, e.g. sealing chamber control, are connected and tested for function.



Risk of electrocution!

Improper use of electricity can be fatal! All pumps with exposed cable ends must be connected by a qualified electrician.

5.7. Direction of rotation

The machine connection must be performed according to the circuit diagram. Testing the direction of rotation is effected by a rotating field testing device.

This is connected parallel to the connection of the pump, and shows the direction of rotation of the existing rotating field. In order for the machine to work correctly, there must be a clockwise rotating field. If an anticlockwise rotating field is displayed, two phases must be swapped.

The stated specifications and performance data can only be achieved if there is a clockwise rotating field. The machine is not designed for if there is an anticlockwise rotating field.

5.8. Motor protection

The minimum requirement is a thermal relay/motor protection circuit breaker with temperature compensation, differential triggering, and reclosing lock in accordance with VDE 0660 or similar national regulations. If the equipment is connected to power grids where problems often occur, we recommend the additional use of protective devices (e.g. overvoltage protection or under voltage protection or phase failure relays, lightning protection, etc.). When connecting the machine, the local and legal requirements must be adhered to.

5.9. Operation of static frequency converter

For inverter operation, the following points should be noted:

- The pump is suitable for use with inverters according to DIN EN 60034-17
- Voltage peaks at the motor coil must be avoided, and, where appropriate, provide suitable filters should be fitted in the motor cable
- Ensure the entire system is properly grounded.
- The specifications of the frequency inverter manufacturer are to be observed
- Under certain circumstances, shielded cable compliant with EMC regulations is required
- The leaflet „use of HOMA pumps with frequency converters“ should be observed

Minimum speed in sewage and drainage pumps

With wastewater and drainage pumps, no minimum speed is specified. However, it is important to ensure that the unit is working jolt and vibration-free, particularly at lower speed ranges. The seals might otherwise be damaged and leak. In addition, it must be ensured that the minimum flow rate is not less than 0.7 m/s.

5.10. Types of startups

Types of startup using with cables with exposed ends

Direct start up

At full load, the motor protection circuit breaker should be set to the rated current. In partial load operation is recommended to set the motor protection circuit breaker 5% above the measured current at the operating point.

Star Delta starting

If the motor protection is installed in the line: Set the motor protection to 0.58 x rated current. The starting time in the Y circuit must be set so that the nominal speed is reached before switching over to the circuit. This is generally the case after 3 seconds. If the motor protection is not installed in the line: Set the motor protection to the rated current at full load.

Power up transformer/soft start

At full load, the motor protection should be set to the rated current. In partial load operation, it is recommended to set the motor protection 5% above the measured current at the operating point. The starting time must be max. 5s. The starting voltage is to be set at 40% of the rated voltage according to the rating plate.

Operation with frequency inverters

The machine can be operated with frequency inverters. Note section 5.9 of this manual.

Start up with plugs/switching devices

Plug the connector into the socket provided and press the on/off switch on the switching device.

5.10.1. After turning on

The nominal current is briefly exceeded on start-up. After completion of this operation, the operating current should not exceed the nominal current. If the motor does not start immediately after switching on, it must be shut down immediately. The switch breaks specified in the technical data must be adhered to before turning on again. If there is a new fault, the machine must again be shut down immediately. The machine may only be started up again after troubleshooting.

The following items should be checked:

- Operating voltage (permissible deviation +/- 5% of the rated voltage)
- Frequency (permissible deviation -2% of the rated frequency)
- Current consumption (permissible deviation between phases max. 5%)
- Voltage difference between the individual phases (max. 1%)
- Switching frequency and pauses (see Technical Data)
- Air entry at the inlet - if necessary, a baffle plate must be attached
- Minimum water coverage, level control, dry run protection
- Smooth running
- Check for leaks: if necessary, take the necessary steps according to the chapter „Maintenance“

6. Maintenance

6.1. General

The machine and the entire system must be inspected and maintained at regular intervals. The time limit for maintenance is set by the manufacturer and applies to the general conditions of use. The manufacturer should be consulted if the system is to be used with corrosive and/or abrasive pumped liquids, as the time limit between inspections may need to be reduced.

Note the following information:

- The operating and maintenance manual must be available to the maintenance personnel and its instructions followed. Only the repair and maintenance measures listed here may be performed.
- All maintenance, inspection and cleaning work on the machine and the system may only be carried out by trained specialists exercising extreme care in a safe workplace. Proper protective clothing is to be worn. The machine must be disconnected from the electricity supply before any work is carried out. There must be no way that it can be inadvertently switched on. Additionally, the appropriate protective measures as defined by the BGV/GNV should be enforced when working in basins and/or containers.
- Above a weight of 50kg, only hoisting gear which has been officially approved and which is in a technically perfect condition should be used for lowering and raising the machine.

Make sure that all fastening devices, ropes and safety devices of the hand winch are in a technically perfect condition. Work may only commence if the auxiliary hoisting gear has been checked and found to be in perfect working order. If it is not inspected, danger to personnel may result!

- Wiring work on the machine and system must be carried out by an electrician. For machines approved for work in areas subject to explosion danger, please refer to the "Explosion protection in accordance with the regulation" chapter.
- When working with inflammable solvents and cleaning agents, fires, unshielded lighting and smoking are prohibited.
- Machines which circulate fluids hazardous to health, or which come into contact with them, must be decontaminated. It must be ensured that no dangerous gases can form or are present.
- Ensure that all necessary tools and materials are available. Tidiness and cleanliness guarantee safe and problem-free operation of the machine. After working on the machine all cleaning materials and tools should be removed from it. All materials and tools should be stored in an appropriate place.
- Operating supplies such as oil and lubricants must be collected in appropriate vessels and properly disposed of (in accordance with the 75/439/EEC directive and with §§5a, 5b AbfG). Appropriate protective clothing is to be worn for cleaning and maintenance jobs. This is to be disposed of in accordance with waste code TA 524 02 and EC Directive 91/689/EEC.

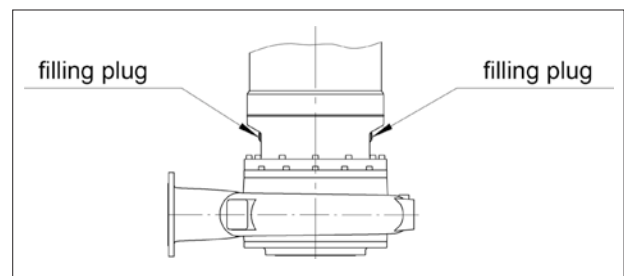
Only lubricants expressly recommended by the manufacturer may be used. Oils and lubricants should not be mixed. Only use genuine parts made by the manufacturer.

A trial run or functional test of the machine must be performed as instructed in the general operating conditions.

Oil type: degradable HOMA-Atox. Used oil is to be disposed accordingly.

When using white oil, note the following:

- The machine lubricants may only be topped up or replaced with lubricants from the same manufacturer.
- Machines which have previously been operated using other lubricants must first be thoroughly cleaned before they can be operated using white oil.



6.2. Maintenance intervals

Before initial start-up or after a longer period of storage:

- Checking the insulation resistance
- Fill level check in sealing room/chamber
- The axial face seal must be checked for damage.

Monthly:

- Monitoring the current consumption and voltage
- Checking the used relays for posistors, sealing room monitor, etc.

Every six months:

- Visual inspection of the power supply cable
- Visual inspection of the cable holder and the cable bracing
- Visual inspection of accessories, e.g. the suspension device and hoisting gears

3,000 operating hours:

- Visual control at pump types with oil chamber
- Visual control at pump types without oil chamber

8,000 operating hours or after two years, whichever is earlier:

- Checking the insulation resistance
- Changing the lubricant in the sealing room/chamber
- Emptying the leakage chamber (not present in all models)
- Functional inspection of all safety and control devices
- Coating check and touch-up as required

15,000 operating hours or after five years, whichever is earlier:

- General overhaul

If it is used in highly abrasive or corrosive material, the maintenance intervals should be reduced!

6.3. Maintenance tasks

Monitoring the current consumption and voltage

The current consumption and voltage is to be monitored periodically during all 3 phases. This remains constant during normal operation. Slight fluctuations are a result of the composition of the pumped fluid. The current consumption can assist in early detection and correction of damage and/ or faulty operation in the impeller/propeller, bearings and/or the motor. More extensive resulting damage can thus be largely prevented and the risk of a total failure can be reduced.

Checking the used relays for posistors, sealing room monitor, etc.

Check the relays used are functioning fault-free. Defective devices must be immediately replaced, because these cannot ensure safe operation of the machine. The test procedure details should be followed closely (in the operating instructions for each relay).

Checking the insulation resistance

To check the insulation resistance, the power supply cable must be disconnected. The resistance can then be measured with an insulation tester (measuring voltage = 1000V DC).

The following values may not be exceeded:

- The insulation resistance may not be below 20 MΩ during initial operation. For all further measurements the value must be greater than 2 MΩ.
- Insulation resistance too low: Moisture may have penetrated the cable and/or the motor.

Do not connect the machine, consult manufacturer!

Visual inspection of power supply cables

The power supply line must be examined for bubbles, cracks, scratches, chafed areas and/or crushed sections. If damage is found, the power cable must be exchanged immediately.

The cables may only be changed by the manufacturer or an authorized/certified service workshop. The machine may not be used again until the damage has been adequately rectified.

Visual examination of the cable holders (carabiners) and the cable bracing

When the machine is used in basins or pits, the lifting cables/cable holders (carabiners) and the cable bracing are subject to constant wear. Regular inspections are necessary in order to prevent the lifting cables/cable holders (carabiners) and/or cable bracing from wearing out and to prevent the electricity cable from being damaged.

The lifting cables/cable holders (carabiners) and the cable bracing are to be immediately replaced if any signs of wear appear.

Visual inspection of accessories

Inspect accessories such as suspension units and hoisting gear to check whether they are secured in a stable manner. Loose and/or defective accessories should be repaired immediately or replaced.

Fill Level Check in Compression Room/Chamber

Visual control at pump types with oil chamber (models without cooling jacket or model „U“ with cooling jacket and open cooling circuit):

Oil Level

Please take the precise filling quantity from the spare parts list or make a request to the manufacturer.

Oil Condition

The condition of the mechanical seals can be visually controlled as follows: Put the pump in horizontal position, so that the screw of the oil chamber is on top (for larger pumps: one of both oil chamber screws). Remove the screw and take out a small quantity of oil. The oil becomes greyish white like milk if it contains water. This may be the result of defective shaft seals. In this case the condition of the shaft seals should be checked by a HOMA Service shop. Oil type: degradable HOMA-ATOX. Used oil has to be disposed according to the existing environmental rules and regulations.

Visual control at pump types without oil chamber with cooling jacket and closed (internal) cooling circuit (“L” Design):

Quantity of Coolant

Please take the precise filling quantity from the spare parts list or make a request to the manufacturer.

The condition of the mechanical seals can be visually controlled as follows: Set up the pump vertically and unscrew the ventilation screw 903.02 located above and remove a small quantity of coolant. If the cooling liquid becomes grey (original colour: light pink) this may be the result of defective shaft seals. In this case the condition of the shaft seals should be checked by a HOMA Service shop. Type: Ravenol (available on request). Used cooling liquid has to be disposed according to the existing environmental rules and regulations.

Functional inspection of safety and control devices

Monitoring devices are temperature sensors in the motor, sealing room monitors, motor protection relays, overvoltage relays, etc.

Motor protection and overvoltage relays and other trip elements can generally be triggered manually for test purposes. To inspect the sealing room monitor or the temperature sensor, the machine must be cooled to ambient temperature and the electrical supply cable of the monitoring device in the switch cabinet must be disconnected. The monitoring device is then tested with an ohmmeter.

The following values should be measured:

Bi-metal sensor: Value = “0” - throughput

PTC sensor: A PTC sensor has a cold resistance of between 20 and 100 Ω. For 3 sensors in series this would result in a value of between 60 and 300 Ω.

PT 100 sensor: PT 100 sensors have a value of 100ohms at 0°C. Between 0°C and 100°C this value increases by 0.385 Ω per 1°C. PT 20 sensors have a value of 107.7 Ω at 20°C.

Moisture sensor: This value must approach infinity. If there is a low value, there may be water in the oil.

Also observe the instructions of the optionally available evaluation relay. **In the case of larger deviations, please consult the manufacturer.** Please consult the appropriate operating manual for details on inspecting the safety and monitoring devices on the auxiliary lifting gear.

General overhaul

During this the bearings, shaft seals, O rings and power supply cables are inspected and replaced as required in addition to normal maintenance work. This work may only be conducted by the manufacturer or an authorized service workshop.

Changing the lubricant

The drained lubricant must be checked for dirt and water content. If the lubricant is very dirty and contains more than 1/3 water, it must be changed again after four weeks. If there is again water in the lubricant then, it seems likely that a seal is defective. In this case, please consult the manufacturer. If a sealing room or leakage monitoring system is being used, the display will light up again within **four weeks** of changing the lubricant if a seal is defective.

The general procedure for changing lubricants is as follows: **Switch off the machine, let it cool down, disconnect it from the mains (have this done by an electrician), clean it and place it vertically on a solid base. Warm or hot lubricants may be pressurized. The leaking lubricant may cause burns. For that reason, let the machine cool down to ambient temperature before you touch it.**

6.4. Sealing chamber

As there are several versions and designs of these motors, the exact location of the screw plugs varies depending on the pump unit used.

- Slowly and carefully remove the filling plug from the sealing room.

Caution: The lubricant may be pressurized!

- Remove the drain plug. Drain the lubricant and collect it in a suitable reservoir. Clean the drain plug, fit with a new sealing ring and screw it in again. For complete drainage, the machine must be slightly tipped on to its side.

Make sure that the machine cannot fall and/or slip away!

- Fill lubricant by means of the opening in the filling plug. Comply with the specified lubricants and filling quantities.
- Clean the filling plug, fit with a new sealing ring and screw it in again.

7. Repairs

7.1. General

The following repairs can be carried out on this machine:

- Changing the impeller and pump unit
- Changing wear rings

When carrying out repair work, the following information should always be noted:

- Round sealing rings as well as existing seals should always be replaced.
- Screw fixings such as spring washers should always be replaced.
- The correct torques must be observed.



In general, the following applies to repairs:

Switch off the machine, disconnect it from the mains (have this done by an electrician), clean it and place it on a solid base in a horizontal position. Secure it from falling over and/or slipping.

If not otherwise stated, the torque values of the below tables should be used. Values stated are for clean, lubricated screws. Fixing torque [Nm] for screws A2/A4 (Coefficient of friction = 0,2)

	A2/A4, Hardness class 70	A2/A4, Hardness class 80
	DIN912/DIN933	DIN912/DIN933
M6	7 Nm	11,8 Nm
M8	17 Nm	28,7 Nm
M10	33 Nm	58 Nm
M12	57 Nm	100 Nm
M16	140 Nm	245 Nm
M20	273 Nm	494 Nm

7.2. Changing the impeller and pump unit

Changing the impeller and the pump unit.

- Loosen and remove the screws on the sealing housing.
- Secure and remove the pump housing from the sealing housing with suitable equipment, e.g. hoisting gear. Place on a secure base.
- Fasten the impeller with suitable equipment, loosen and remove the impeller fastening (cylindrical screw with socket hex).

Pay attention to the locking screw!

- Remove the impeller from the shaft using a suitable extractor.
- Cleaning the shaft
- Attach a new impeller to the shaft.

Make sure that the sliding surfaces do not become damaged!

- Screw a new impeller fastener (cylinder screw with socket hex and a new screw fixing) back into the shaft. Fasten the impeller and tighten the fastening screw.
- Place the pump unit on the sealing housing and fasten it with screws.
- It must be possible to turn the impeller by hand.

Changing wear ring

The stationary and mobile wear ring determine the gap between the impeller (mobile wear ring) and the intake port (stationary wear ring). If this gap is too big, the performance of the machine decreases, and/or it can lead to entanglements.

Both rings are designed so that they can be replaced. This minimizes wear on the intake port and impeller, consequently reducing expense for spare parts.

Changing sealing parts

Changing sealing parts on the liquid side such as the block seal cartridge and the mechanical seal shaft requires a certain amount of specialist knowledge about these sensitive components. In addition to this, in order to carry out the work, much of the machine must be dismantled.

Only original parts may be used for replacement!

Inspecting and replacing these parts is performed by the manufacturer during the general overhaul or by specially trained personnel.

For machines approved for work in areas subject to explosion danger, please refer to the "EX-protection" in the appendix.

8. Shutdown

8.1. Temporary shutdown

For this type of shutdown, the machine remains installed and is not cut off from the electricity supply. For temporary shutdown, the machine must remain completely submerged so that it is protected from frost and ice. Make sure the operating room and the pumped fluid cannot be covered by ice. This ensures that the machine is always ready for operation. During longer shutdown periods, carry out a regular (monthly to quarterly) function run for a period of 5 minutes.



Caution!

Only carry out a function run under the proper conditions of operation and use. Never run the machine dry. This can result in irreparable damage!

8.2. Final shutdown / storage

Switch off the system, disconnect the machine from the electricity supply and dismantle and store it.

Note the following information concerning storage:



Beware of hot parts!

When removing the machine, be careful of the temperature of the housing components. These can heat up to well above 40°C. Let the machine cool down to ambient temperature before you touch it.

- Clean the machine.
- Store it in a clean, dry place, protect the machine against frost.
- Place it down vertically onto a firm foundation and secure it against falling.
- Seal the intake and discharge ports of pumps with suitable material (such as foil).
- Support the electric connecting lead on the cable lead-in to help avoid a permanent deformation.
- Protect the ends of the electric power cable from moisture.
- Protect the machine from direct sunshine as a preventive measure against brittleness in elastomer parts and the propeller and casing coating.
- When storing the machine in a garage please remember: Radiation and gases which occur during electric welding destroy the elastomers of the seals.
- During lengthy periods of storage, regularly (for example every six months) turn the impeller or propeller by hand. This prevents indentations in the bearings and stops the rotor from rusting up.

8.3. Restarting after an extended period of storage

Before restarting the machine, clean it of dust and oil deposits. Then carry out the necessary maintenance actions (see "Maintenance"). Check that the mechanical shaft seal is in good order and working properly. Once this work has been completed, the machine can be installed (see "Installation") and connected to the electricity supply by a specialist. See "Start-up" for instructions on restarting.

Only restart the machine if it is in perfect condition and ready for operation.

9. Troubleshooting

In order to prevent damage or serious injury while rectifying machine faults, the following points must be observed:

- Only attempt to rectify a fault if you have qualified personnel. This means each job must be carried out by trained specialist personnel, for example electrical work must be performed by a trained electrician.
- Always secure the machine against an accidental restart by disconnecting it from the electric system. Take appropriate safety precautions.
- Always have a second person make sure the machine is switched off in an emergency.
- Secure moving parts to prevent injury.
- Independent work on the machine is at one's own risk and releases the manufacturer from any warranty obligation.

The machine will not start	
Cause	Remedy
Electricity supply interrupted – short circuit or earth connection in the cable or motor windings	Have the motor and wires checked by a specialist and replaced if necessary
Fuses, the motor protection switch and/or monitoring devices are triggered	Have a specialist inspect the connection and correct them as necessary Have the motor protection switch adjusted according to the technical specifications, and reset monitoring equipment. Check that the impeller/propeller runs smoothly. Clean it or free it as necessary
The moisture sensors (option) has interrupted the power circuit (operator-related)	See fault: Mechanical shaft seal leaks, sealing chamber monitor reports fault and switches the machine off

Machine runs but does not pump	
Cause	Remedy
No pumped fluid	Open the container intake or sliders
Intake blocked	Clean the intake, slider, suction port or intake strainer
Impeller/propeller blocked or obstructed	Switch off the machine, secure it against being switched on again and free the impeller/ propeller
Defective hose or piping	Replace defective parts
Intermittent operation	Check the control panel

The motor starts, but the motor protection switch triggers shortly after start-up	
Cause	Remedy
The thermal trigger on the motor protection switch is incorrectly set	Have a specialist compare the setting of the trigger with the technical specifications and adjust it if necessary
Increased power consumption due to major voltage drop	Have an electrician check the voltage on each phase and rewire if necessary
Excessive voltage differences on the three phases	Have a specialist inspect the connection and the switching system and correct it as necessary
Incorrect direction of rotation	Swap the 2 phases from the mains supply
Impeller/propeller impeded by adhesive material, blockages and/or solid matter, increased current consumption	Switch off the machine, secure it against being switched on again and free the impeller/ propeller or clean the suction port
The pumped fluid is too dense	Contact the manufacturer

The machine runs, but not at the stated operating levels	
Cause	Remedy
Intake blocked	Clean the intake, slider, suction port or intake strainer
Slide in the discharge line closed	Fully open the slide
Impeller/propeller blocked or obstructed	Switch off the machine, secure it against being switched on again and free the impeller/ propeller
Incorrect direction of rotation	Replace 2 phases on the mains supply
Air in the system	Check the pipes, pressure shroud and/or pump unit, and bleed if necessary
Machine pumping against excessive pressure	Check the slide in the discharge line, if necessary open it completely
Signs of wear	Replace worn parts
Defective hose or piping	Replace defective parts
Inadmissible levels of gas in the pumped liquid	Contact the factory
Two-phase operation	Have a specialist inspect the connection and correct it as necessary

The machine does not run smoothly and is noisy	
Cause	Remedy
Machine is running in an impermissible operation range	Check the operational data of the machine and correct if necessary and/or adjust the operating conditions
The suction port, strainer and/or impeller/propeller is blocked	Clean the suction port, strainer and/or impeller/ Propeller
The impeller is blocked	Switch off the machine, secure it against being switched on again and free the impeller
Inadmissible levels of gas in the pumped liquid	Contact the factory
Two-phase operation	Have a specialist inspect the connection and correct it as necessary
Incorrect direction of rotation	Incorrect direction of rotation
Signs of wear	Replace worn parts
Defective motor bearing	Contact the factory
The machine is installed with mechanical strain	Check the installation, use rubber spacers if necessary

Mechanical shaft seal leaks, sealing chamber monitor reports fault and switches the machine off	
Cause	Remedy
Increased leakage when running in new mechanical shaft seals	Change the oil
Defective sealing chamber cables	Replace the moisture sensors
Mechanical shaft seal is defective	Replace the mechanical shaft seal after contacting the factory

Further steps for troubleshooting

If the items listed here do not help you rectify the fault, contact our customer service. They can help you as follows:

- Telephone or written help from customer service
- On-site support from customer service
- Checking and repairing the machine at the factory

Note that you may be charged for some services provided by our customer support. Customer service will provide you with details on this.

10. Supplement to ex-protection implementation

10.0. Declaration of Conformity

Manufacturer: HOMA Pumpenfabrik GmbH
 Industriestraße 1
 D-53819 Neunkirchen-Seelscheid

For pump series:

H	CH	CTP	TP	GRP	ETM
MX(S)	V	VX	K	KX	KSX

Including Motor types:

Submersible motor type	Product-marking	Product-marking including Intrinsic safety
(C)AM 120	Ex II 2 G Ex c d IIB T4 (T3)	-
(C)AM 122	Ex II 2 G Ex c d IIB T4 (T3)	-
(C)AM 136	Ex II 2 G Ex c d IIB T4 (T3)	-
(C)AM 173	Ex II 2 G Ex c d IIB T4 (T3)	-
AM 204	Ex II 2 G Ex c d e IIB T4 (T3)	Ex II 2 G Ex c d e ib IIB T4 (T3)
AM 210	-	Ex II 2 G Ex c d ib IIB T4 (T3)
AM 243	Ex II 2 G Ex c d e IIB T4 (T3)	Ex II 2 G Ex c d e ib IIB T4 (T3)
AM 303	Ex II 2 G Ex c d e IIB T4 (T3)	Ex II 2 G Ex c d e ib IIB T4 (T3)
AM 376	Ex II 2 G Ex c d e IIB T4 (T3)	Ex II 2 G Ex c d e ib IIB T4 (T3)
AM 421	-	Ex II 2 G Ex c d e ib IIB T4 (T3)

Applied Directive: 2014/34/EU

Applied harmonized standards:

EN 60079-0:2012	EN 1127-1:2011
EN 60079-1:2014	EN 13463-1:2009
EN 60079-7:2007	EN 13463-5:2011
EN 60079-11:2012	

EC Type-Examination by:

DEKRA Certification B.V. NL; label 0344
 TÜV Rheinland Industrieservice GmbH; label 0035

We declare as manufacturer:

Products labelled accordingly meet the requirements of the listed directive and standards. This declaration loses its validity in case of any product modifications that are not approved by HOMA Pumpenfabrik GmbH.



Vassilios Petridis
 Manager development and production

10.1. General information

Application validity

The validity of these operating instructions apply exclusively to HOMA explosion protected submersible motor pumps. The general operating instructions are to be observed together with these operating instructions.

Area of application

The information in these additional operating instructions apply only for HOMA equipment that are used in potentially explosive zones.



Caution! Non-adherence to the instructions can lead to explosions!

10.2. Intended use according to RL94/9/EG

Definition of terminology

Explosion-protected submersible motor pumps are primarily intended for waste waters with slimes, solids, fibers, feces as well as soiled waters of all types. The atmospheres of the areas where the units are used may be explosive due to the local operational circumstances.

Conditions for use



Caution! The intended use of the explosion-protected submersible motor pumps always assumes a cover of fluids of the pump hydraulics in order to ensure a primary explosion protection of the mechanical part in normal operation!



Caution! The machines must never be run in idle. This must be ensured by a level control as described in 4.3.



Caution! The machines must only be operated in the power range between the input power P_{1max} and P_{1min} in order to effectively prevent a critical temperature at the outside motor surface. For data of the power limits see Appendix Table 1, electrical data or the information in the respective type examination certificate. Due to its model testing design, the electrical part (submersible motor) may be used in potentially explosive regions of the zones 1 and 2. HOMA ex-protected submersible motors model AM satisfy the requirements for electrical equipment for potentially explosive areas according to DIRECTIVE 94/9/EG OF THE EUROPEAN COUNCIL OF MARCH 23, 2014 for intended use in potentially explosive areas of the:

Equipment group II Category 2 application conditions for Zones 1 and 2.

Devices in this category are only intended for use in areas in which it can be expected that an explosive atmosphere of gases, condensates, mists or dust/air mixture could occasionally occur. The following standards are decisive for ex-relevant implementation for ex-protected submersible motors for the electrical and mechanical part.

EN 60079-0:2006	„General determinations“
EN 60079-1:2007	Flameproof enclosures „d“
EN 60079-7:2007	Enhanced security „e“
EN 60079-11:2007	Intrinsic safety „i“
EN 1127-1:2007	Potentially explosive atmospheres - explosion protection Part 1 - Fundamentals and methods
EN 13463-1:2009	Part 1: Non-electrical equipment for use in potentially explosive areas Fundamentals and requirements.
EN 13463-5:2003	Protection by constructional safety „c“

Definition of the ignition protection type

The design direction for ex protection of the HOMA-produced explosion-protected equipment is achieved by means of

Ignition protection type: pressure-tight enclosure „d“. In this, the parts that can ignite a potentially explosive atmosphere are arranged in a housing that, in the explosion of a potentially explosive mixture inside it, withstands the pressure and thus prevents a transfer of the explosion to the potentially explosive atmosphere surrounding the housing. Equipments that possess a separate connection chamber, additionally satisfy the requirements of the ignition protection type. Enhanced security „e“.

In the case that instrument lines are fed for connection from simple electrical equipment corresponding to EN 60079-11 PARA. 5.4 through the pressure-tight enclosed chamber (conductance measurement, float switch as leak monitoring, etc.), then these satisfy the requirements of ignition protection type. Intrinsic safety „i“. The ignition type of safety „c“ is applied in order to adhere to the device protection in explosive-endangered areas for non-electrical equipment (mechanical ex-protection). For this purpose it is possible to make use of structural measures, which, by means of sufficient dimensions of the components, provide protection against possible ignition by moving parts, generated heated surfaces, sparks and adiabatic compression.

Certification

The EU type examination certificates for explosion-protected submersible motor pumps are issued by the DEKRA CERTIFICATION B.V. in Arnheim / NL.

DEKRA . . . ATEX

(certificates before 2011)

KEMA . . . ATEX

(see rating plate)

Together with the notification on the recognition of the quality assured production and the conformity declaration according to EN 45014 of the manufacturer, it is permitted, according to Directive 94/9/EG that explosion-protected equipment is taken into goods traffic or operation. Labeling of explosion-protected submersible motor pumps (see conformity certificate Page 2)

10.3. Safety information

General information



Caution! Interventions into explosive-protected equipment may only be carried out by officially „qualified persons“ or workshops or persons authorized by us. Any works, installation, repairs and servicing and monitoring must be carried out with observing to these operating instructions and the associated documentation!

Safety during servicing



Caution! Before servicing or repair is carried out in explosive-protected electrical equipment, it is to be separated from the grid and to be secured against inadvertent switching-on. If the motor is situated in a potentially explosive atmosphere, then it is to be removed from the ex area before opening. The pump shaft must be sufficiently vented via the exhaust system before disconnecting and pulling out of a submersible motor pump from the coupling automatic for the purpose of revision work on explosion-protected submersible pump installations!

Safety for electrical connections



Caution! The electrical connection of the equipment to the plant controls may only be carried out using the wiring diagram provided. Independent handling leads to danger of health and life and generally invalidates the guarantee. Every explosion-protected submersible motor is equipped with bi-metallic thermal switch or thermal elements (PTC thermistor) as a temperature limiter. These must be switched according to the original switching plan such that an automatic restart lock becomes effective when the critical temperature has been reached. After successful switch-off or removal of damage, the explosion-protected submersible motor must be manually reconnected to the grid.

10.4. Conditions from the EU type examination certificate

Description of the motor cooling systems

Submersible motor pumps with submersible motor AM/...EX consisting of a hydraulic pump part coupled via a common motor shaft to a 3-phase motor. The motor is equipped with a permanently fixed power cable.

The submersible motor series AM/...EX are cooled by means of the pumping medium and are suited for continuous operation S1 with fully covered motor for pumping raw waste water with slime and solids.

The submersible motor series AM/...LEX are cooled by means of a closed cooling system and are thus suited for continuous operation S1 with not-covered motor for pumping raw waste water with slime and solids.

The submersible motor series AM/...UEX are cooled by a by-pass part-flow of the pumping medium and are thus suited for continuous operation S1 with not-covered motor for pumping the raw waste water without sedimenting slime or solids.

Determination

The operating instructions of the manufacturer must be followed in order to ensure proper and safe operation of the equipment. In addition, due care must be taken of the local installation guidelines!

The submersible motors are equipped with temperature limiters in the stator windings for direct motor control. The level of the limiting temperature can be obtained from Table 1 in the Appendix! The submersible motor pumps can be optionally equipped with detector electrodes and internal level off-switches.



Caution! The AM303/AM376/AM421 and AM500 model sizes are generally equipped with the abovementioned monitoring systems. Both the detector electrodes as well as the magnetic float switches are tested as intrinsically ex-safe (Ex ib) „Simple electrical equipment“ according to EN 60079-11 Chap 5.4 and are to be taken into operation with the corresponding connection measures as described below. (test report IECEx Test Report No.NI/KEM/ExTR10.0039/01)

Environmental temperature -20°C to +40°C
Max. Pumping medium temperature +40°C



Caution! For submersible motors that are operated using frequency regulation, the temperature classification is T3! The frequency shown on the rating plate must not be exceeded in the conversion operation.

Installation information



Caution! The following measures will achieve a safety level of SIL2, as ignition monitoring measure for prevention of the coming into effect of a potential source of ignition, for normal operation of the equipment for the equipment group II and Category II. (applies only for units with AM303; AM376; AM421 motors) THE OPERATOR OF THE PLANT must obtain for the adherence to the ignition protection an own independent installation consisting of a combination of an electro-mechanical actuating system (level regulation) in order to guarantee the required minimum coverage of the pump hydraulics of at least 0.2 m. The level safety system must verify a safety integrity level SIL2!

Before first start-up of the equipment, the level regulation is to be tested as a safety system SIL2 and approved for function and accuracy according to the setting parameters. The control of the plant is to be arranged such that an automatic repeat switching-on lock after a switch-off of the equipment via the level regulation, automatically sets the automatic switching-on of the plant out of action. Only after successful finding and repairing the error may the plant be manually put into operation again.

The optical and acoustic warning messages of the level regulation must be designed according to ergonomic principles and provided unmistakable and clear information to the operator so that the necessary measures for avoiding potential sources of ignition can be initiated with a high degree of safety.



Caution! The function and effectiveness of the leveling adjustment must be monitored at regular intervals. A complete inspection must be carried out at last every 3 months!

The submersible motor series AM/...EX are cooled by means of the pumping medium and are suited for continuous operation S1 with fully covered motor. The motor part must be fully submerged in order to prevent the surface temperature rising above the temperature classification stated on the rating plate. However, with tight pump shafts, a time of max 10 min can elapse until a level of 0.2 m over the pump part is emptied.

The submersible motor series AM/...UEX is cooled by means of a by-pass part flow of the pumping medium. Here, too, the pump part must be fully submerged in order that the surface temperature does not rise above the temperature classification stated on the rating plate. The connection of free ends of the power cable may only be carried out inside the potentially explosive areas by means of suitable ex-tested and certified terminal boxes. No certified terminal boxes need be used outside of potentially explosive areas.

A connection with minimum 4 mm² must be installed to the submersible motor pumps for the potential equalization according to EN 60079-14. The cable is connected to this by means of lugs and screw security of the connection must not be self-loosening.

All existing thermal, level and detector sensors must be connected according to the instructions of this manual and the accompanying circuit diagram.

Special conditions for safe operation

For the converter operation it is necessary to have an arrangement for direct temperature monitoring. This consists of a PT thermistor built into the coil according to DIN 44 082 with switching temperature according to Table 1 and a function-tested triggering device according to RL 94/9/EG. The switching is to be designed such that when reaching the limiting temperature, the submersible motor is switched off and a renewed start-up of the submersible motor is only possible manually! When checking the gaps of the pressure-tight enclosed motor, it is absolutely necessary to contact the manufacturer of the submersible motor in order to obtain the gap dimensions. **The gap of the tested submersible motor is less than that prescribed by the standards.**

The fastening bolts of the motor are special bolts of stainless steel type A2-70.

10.5 Installation and start-up of explosion-protected submersible motors

General information



Caution! Before starting any activity at the site of the equipment, it is important to obtain knowledge on the status of the danger of explosion from the user. The danger potential can be estimated on the basis of official zone allocation or an existing explosion protection document. Possibly a comparison should be made between the ex-ignition type of the equipment and the given requirements. In the case of enclosed spaces of shafts, sufficient ventilation must be ensured before starting work in order to thus prevent the existence of explosive gases.

HOMA explosion-protected equipment must only be used in areas (potentially explosive atmospheres) which are applicable for their declared equipment group II and category 2G, as well as maximum surface temperature of 135°C for temperature classification T4 (for frequency converters operation 200°C for temperature classification T3) in accordance with IEC 60079-0 for gases and explosion groups A and B.

Installation information for the electrical part



Caution! It is absolutely necessary that, in addition to this instruction manual, attention is also paid to the information in the EU type examination certificate in the Appendix as is mentioned here again.

10.5.1. Electrical connection

The connection of the power cables may only be carried out inside the potentially explosive areas by means of suitable ex-tested and certified terminal boxes.

10.5.2. Monitoring arrangements

Additional and monitoring arrangements with suitable verification and explosion protection labeling are to be selected according to the conditions at site. Monitoring units must satisfy the requirements of the ATEX 100a, Appendix II, Sections 1.5.5 and EN 1127-1 (potentially explosive atmospheres - Explosion protection - Part 1: Fundamentals and methods). In the case that in the explosion-protected submersible motor pumps electrical monitoring sensors are installed outside the enclosed chamber, then their control circuits must be carried out inside the motor by the manufacturer in the ignition protection type intrinsic safety „i“ according to EN 60079-11:2007.

A potential equalization is installed in the whole intrinsically safe circuits. A further grounding of the ex-intrinsically safe circuits is not permissible. The use of this equipment may only be carried out in the ex-area of the device group II category 2 when certified ex-intrinsically safe electrode relays are used and an intrinsically safe circuit of the ignition protection type EX [ib] with the following values has been used:

- $U_i = 28 \text{ V max}$
- $I_i = 300 \text{ mA max}$
- $P_i = 1.3 \text{ W max}$

The effective internal inductivity L_i and the capacity C_i are negligibly small. In automatic operation with float switches, these must be installed according to VDE 0165 as intrinsically safe circuits in the ignition protection type intrinsically safe „i“ and connected to an ex-intrinsically safe transistor relay. From motor sizes AM303 there is built in as standard and in accordance with previously described protective measures, each a conductivity probe and a magnetic buoyancy floating switch (only for vertical operation) in the oil bearings. A temperature excess above 130°C (T4) at the seals as well as at the housing surface is safeguarded according to the measures mentions in Section 4.3!



Caution! In ex intrinsically safe circuits the instrument lines are marked in blue.

10.5.3. Operating off the grid

It is also absolutely necessary that for operating off the grid to install with thermally delayed excess power triggers also temperature limiters with the strand designations T1 and T2 to the controls in accordance with the connection diagram!

10.5.4. Frequency converter operation

For frequency converter operation it is absolutely necessary to install an arrangement for direct temperature monitoring. This consists of a PT thermistor built into the coil according to DIN 44 082 and a function-tested triggering device according to RL 94/9/EG.

The excess power protection arrangement is to be seen here as additional monitoring. The power limitation of the converter is set at the highest to 3 x the motor current.

10.5.5. Potential equalization

It is possible for equalization flows (stray or leakage currents) to flow intermittently or continuously in electrically conducting plants or components. For this purpose it is necessary to install a potential equalization in accordance with EN 60079-14. On the ex-protected HOMA submersible motors there are installed an outer connection of min 4 mm² to max. 6 mm² for creating a potential equalization. Further application information for this is to be taken from the applicable country explosion protection ordinances.

Installation information for the mechanical part



Caution! The fluid cover of the pump hydraulic must be monitored by a leveling control!

10.5.6. Danger due to spark generation

Mechanically generated sparks can ignite flammable gases and condensates. According to EN 1127-1 Para. 6.4.4, sparks must also be excluded for category 2 in normal operation. In normal operation no spark generation is possible due to fluid covering (medium covering of the pump hydraulic). The ingress or suction of foreign bodies (stones, pieces of metal, etc) through the suction nozzles into the pump hydraulic is not possible in an expected case of malfunction in which the enclosure fails as the pump cannot suck up pumping medium nor its containing solids. In the ventilated shaft, the explosion-protected submersible motor pumps are drained via a drain system with two guide tubes of galvanized steel, between their guide claws of grey cast iron that guide it into the automatic coupling arrangement. The guide velocity, with max 0.1 m/s (10 cm/s) is so low that no sparks can be generated even in the most disadvantaged conditions. In the first installation, the guide claws of the drain arrangement should be lubricated with ball bearing grease in order to suppress heat and spark generation in the most disadvantaged case.

10.5.7. Danger due to hot surfaces

Hot surfaces can only occur in the case of an expected malfunction. Here an operational heating to a maximum of 70% of the temperature classification limit T4 (135°C) can be expected. However, if, in the case of a malfunction, the temperature limit is reached, then the temperature monitoring of the electric motor, which is connected with the mechanical part (pump) by means of a common shaft will force the whole unit to be separated from the grid.



Caution! As a preventive measure for the occurrence of temperatures at the mechanical part of the submersible motor above the temperature classification T4, a level safety system with a safety-integrity level SIL2 is to be installed and checked. (see Chap. 4). The safety system is to be programmed and switched such that an operation of the unit is only permitted with a prescribed medium cover of the pump hydraulic of a minimum of 0.2 m.

10.5.8. Danger due to static charge

Under certain circumstances, electrostatic charge can release flammable discharges. The HOMA explosion-protected submersible pumps contain no rechargeable insulated conducting components such as plastics. In addition, there is an external connection for generating the potential equalization which must be installed by the user. If further components or elements installed in the ex-zone, then the user is required as the most important measure according to EN1127-1 Para 6.4.7, to undertake the linking and grounding of all conducting parts and substances.

10.6. Start-up

If all the required and previously described installations, safety and process instructions are carried out, then the pump system must be taken into operation by an electrical technician and tested as follows:



Caution! In order to ensure that the pump system actually works as described in Para 2.2.3 of the application conditions, a measurement of the power consumption (KW) is to be carried out and checked with the information in the table in Appendix 1. As the pump first pumps into an empty pipe system, a higher power consumption will be set at the start of the pumping, depending on the height and length. Let the pump continue until a final and stable power consumption is set.

If the power consumption is within the given power limits of the motor then the explosion-protected submersible motor pump can be finally taken into service. If it is then seen that the power consumption is outside of the given power limits of the motor, then the explosion-protected submersible motor pump must not be taken into service. In this case the pipe characteristic of the installed pressure pipe is to be calculated and determined. The actual operating point of the plant can be determined with the use of the in-house HOMA HOPSEL pump design program. For safe and ex-conformity start-up contact an employee of the HOMA Company!

10.7. Repair, servicing and interventions into explosion-protected submersible motors

For repairs or interventions, first observe the safety determinations, especially those relevant for ex-protective aspects as described above.

Who is permitted to repair ex-equipment?



Caution! Repair measures must only be carried out by the works customer service or persons delegated by us or workshops with an officially recognized „Authorized person“

Gap dimensions



Caution! In the case of external repairs it is necessary to obtain information on the model type approval and the particular conditions, e.g. gap dimensions. Gap surfaces must not be worked on!

Servicing intervals of ball bearings



Caution! Besides the operating instructions for servicing intervals for non-explosion-protected submersible motor pumps, the ball bearings must be replaced at the latest after 25,000 hours. Depending on the type of operation of the submersible motor pumps, this time can be achieved in approximately 4 years.

Spare parts



Caution! In the purchasing of spare parts use only the original spares mentioned in the appended parts list. Especially the seals and cables are created in part from temperature and aging-resistant materials.

Cable connection after repair



Caution! The cables are to be connected according to the wiring diagram for the explosion-protected submersible motor pumps to the ex-terminal board or to the flameproof conductor bushing.

10.8. Technical data

For details see the general operating instructions with data sheets. The data in the original type plate placed on the machine should be entered in the adjoining depiction of the type plate in order thus to be available for any queries.

11. Connection of pumps and mixers



Danger from electric current!

Incorrect working with electric current brings danger to life! All pumps with bare cable ends must be connected by a skilled electrician.

11.1 Power cables

Pumps in Star 3-phase version

Cable identification Motor	Terminal in control cabinet
U1	U1
V1	V1
W1	W1
U2	U2
V2	V2
W2	W2

Pumps in Direct start version

Cable identification Motor	Terminal in control cabinet
U	U1
V	V1
W	W1

11.2 Control cables

Depending on the design of the pump/agitator, it may be that no separate control cable is used. In this case monitoring devices are run from the power cable.

Cable identification Motor	Monitoring system
Monitoring in winding	
T1 / T2	Temperature limiter (2 switches in series)
T1 / T4	Temperature controller (2 switches in series)
T1 / T2 / T3	Temperature limiter and controller
K1 / K2	PTC – Thermistor (3 thermistors in series)
PT1 / PT2	3 x PT100 individually installed
PT3 / PT4	
PT6 / PT6	
Bearings monitoring	
P1 / P2	PT100 upper bearing
P3 / P4	PT100 lower bearing
Seal monitoring	
S1 / S2	Seal monitoring in oil chamber
S3 / S4	Seal monitoring in connection compartment
S5 / S6	Seal monitoring in Motor compartment with 2 Electrodes
S7 / S8	Seal monitoring in Motor compartment with float switch
S9 / S10	Seal monitoring in Gearbox (Agitator)
S11 / S12	Seal monitoring in Leakage compartment (internal cooling)
Heating	
H1 / H2	Heating system

12. Kontaminationserklärung

Die Instandsetzung der Geräte/Geräteteile wird nur durchgeführt, wenn eine korrekt und vollständig ausgefüllte Kontaminationserklärung vorliegt. Sonst kommt es zu Verzögerungen der Arbeiten.

RÜCKFAX an HOMA Pumpenfabrik GmbH:... +49 (0) 2247 702 - 44

Gerätedaten:
Pumpenbezeichnung: _____
Artikelnummer: _____
Seriennummer: _____

Grund der Einsendung: _____

Einsatzbedingte Kontaminierung des Gerätes:		
toxisch	nein <input type="checkbox"/> ja <input type="checkbox"/>	welche Stoffe: _____
ätzend	nein <input type="checkbox"/> ja <input type="checkbox"/>	welche Stoffe: _____
mikrobiologisch	nein <input type="checkbox"/> ja <input type="checkbox"/>	welche Stoffe: _____
explosiv	nein <input type="checkbox"/> ja <input type="checkbox"/>	welche Stoffe: _____
radioaktiv	nein <input type="checkbox"/> ja <input type="checkbox"/>	welche Stoffe: _____
sonstige Schadstoffen	nein <input type="checkbox"/> ja <input type="checkbox"/>	welche Stoffe: _____

Rechtsverbindliche Erklärung:	
Hiermit versichern wir, dass die Angaben korrekt und vollständig sind und wir anfällige Folgekosten akzeptieren. Der Versand des kontaminierten Gerätes erfüllt die gesetzlichen Bedingungen.	
Firma: _____	
Strasse: _____	PLZ, Ort: _____
Ansprechpartner: _____	
Telefon: _____	Telefax: _____
E-Mail: _____	
_____	_____
Datum	Unterschrift (mit Firmenstempel)

12. Declaration of Contamination

The repair of the instruments can only be accomplished if this document is filled out completely and accurately.

ANSWER by FAX: HOMA Pumpenfabrik GmbH:... +49 (0) 2247 702 - 44

Pump data:	
Type:	_____
Part No:	_____
Serial no:	_____

Reason for return:	_____

Contamination of the instruments:		
toxic	no <input type="checkbox"/> yes <input type="checkbox"/>	substance: _____
corrosive	no <input type="checkbox"/> yes <input type="checkbox"/>	substance: _____
microbiological	no <input type="checkbox"/> yes <input type="checkbox"/>	substance: _____
explosive	no <input type="checkbox"/> yes <input type="checkbox"/>	substance: _____
radioactive	no <input type="checkbox"/> yes <input type="checkbox"/>	substance: _____
other substances	no <input type="checkbox"/> yes <input type="checkbox"/>	substance: _____

Legally binding declaration:	
We hereby certify that the returned parts have been cleaned carefully. To the best of our knowledge, they are free from any residues in dangerous quantities.	
Company: _____	
Street: _____ Zip code, City: _____	
Contact person: _____	
Phone: _____ Fax: _____	
e-mail: _____	

Date	_____
	Company stamp and signature



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