



**Tauchmotorpumpen**  
**Submersible motor pumps**  
**Pompes submersibles**

Diese Betriebsanleitung enthält wichtige Hinweise und Warnvermerke. Bitte vor Einbau, elektrischem Anschluss und Inbetriebnahme unbedingt lesen.

Weitere Betriebsanleitungen, die Komponenten dieser Anlage betreffen, müssen zusätzlich berücksichtigt werden.


These operating instructions contain fundamental information and precautionary notes. Please read the manual thoroughly prior to installation of unit, connection to the power supply and commissioning.

It is imperative to comply with all other operating instructions referring to components of this unit.

La présente notice comporte des instructions et des avertissements importants. Elle doit être lue avant l'installation, le branchement électrique et la mise en service.

Les notices relatives aux composants de ce groupe sont également à respecter.



Submersible motor pumps	
	Type series
	Amarex N
	Pump size
	DN 32
	Motor size
	02 ... (2 poles)
	Material variant
	G

Works No.: see name plate

Dear Customer,

Thank you for purchasing a submersible motor pump, type Amarex® N, from KSB.

The safety instructions to be observed for installation, operation, maintenance and servicing of the pump set are marked with the following symbols:



General hazard sign to ISO 3864-B-3-1 for hazards to persons.



Hazard sign to ISO 3864-B-3-6 for electrical hazards



Safety symbol to DIN 4844-W8 for instructions which must be complied with to maintain the explosion-proof status of the pump set in acc. with Directive 94/9/EC (ATEX 100a).

**CAUTION**

This word is used to introduce safety instructions whose non-observance may lead to damage to the machine and its functions.

**Table of contents**

	Page
1 General	16
2 Safety	16
3 Transport	17
4 Description of the product	17
5 Installation at site	17
6 Commissioning, start-up/shutdown	21
7 Maintenance/repair	22
8 Trouble-shooting	25
9 Annex	38

## 1 General

This KSB pump set has been developed in accordance with state-of-the-art technology; it is manufactured with utmost care and subject to continuous quality control.

These operating instructions contain important information for reliable and safe operation of the pump set.

This pump set must not be operated outside its specified operating range. The limits stated in the technical documentation must not be exceeded under any circumstances.

Non-compliance with this operating manual will lead to forfeiture of any and all rights to claims for damages.

If you need any additional information or instructions exceeding the scope of this manual or in case of damage please contact KSB's nearest customer service centre (see enclosed directory of addresses).

## 2 Safety

### 2.1 Safety instructions

Non-compliance with the safety instructions laid down in this chapter on "Safety" and other chapters of this operating manual may result in personal injury and damage to property for the operator and/or third parties.

Notes on using the operating manual:

- All personnel involved in the assembly, installation and maintenance of the unit must be **thoroughly familiar with these operating instructions**.
- The operating manual must always be kept close to the location of operation of the machine for easy access.



### 2.2 Personnel qualification and training

All personnel involved in the operation, maintenance, inspection and installation of the unit must be fully qualified to carry out the work involved. The operator is responsible for assigning personnel and providing appropriate training and instruction. The operator may commission the manufacturer to take care of such training. In addition, the operator is responsible for ensuring that the instructions of this operating manual are observed.

### 2.3 Compliance with statutory safety requirements

These operating instructions do not take into account local regulations; responsibility for compliance with such regulations lies with the operator.

Small children and persons who are mentally or physically unable to comply with the safety regulations shall be kept away from the pump.


 Instructions which must be adhered to when the pump is installed in potentially explosive atmospheres are specially marked with the Ex  symbol.

### 2.4 Safety instructions for work on the machine

Work on the machine/unit must be carried out only during standstill. The shutdown procedure described in the manual for taking the unit out of service must be adhered to without fail (section 7).

Pump sets handling liquids posing health hazards must be decontaminated.

Immediately following completion of the work, all safety-relevant and protective devices must be re-installed and/or re-activated. The instructions given in section 6 shall be adhered to.

 If the pump/unit is located in a potentially explosive atmosphere, it is imperative to make sure that any operation of the unit outside its design data and operating limits is absolutely prevented. Non-compliance with this requirement may result in the given temperature classes being exceeded, sparking, leakage of explosive mixtures and therefore explosions.


- Make sure to prevent dust from collecting in hazardous amounts on the unit, especially in areas of high surface temperature.

### 2.5 Repair and modification work

Repair and modification work on the pump set are only permitted after consultation with the manufacturer. Original spare parts and accessories authorised by the manufacturer ensure safety.

The use of other parts will lead to forfeiture of any and all rights to claims for damages.

### 2.6 Explosion protection

 Installation and operation of the pump sets in potentially explosive atmospheres shall be governed by the provisions of Directive 94/9/EC (ATEX 100a).

The motors may be connected to electrical low-voltage grids with nominal voltages and voltage tolerances to IEC 38 or other grids or power supply facilities with max. nominal voltage tolerances of  $\pm 10\%$ .

The motor must be protected by an overload protection device. Motor overload protection can be realised by:

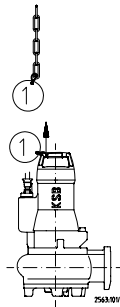
- limiting the current (e.g. by means of a motor protection switch to EN 60 974-2). In this case, the rated current (see name plate) must be set. The running motor must be cut out within 15 minutes after 1.15 times the rated current has been reached.
- limiting the temperature by means of bimetal switches integrated in the stator. The bimetal switches must be connected to a tripping unit.

When reaching the temperature limit, the motor must be cut out by means of a tripping unit in order for the equipment to comply with the ATEX 100a Directive. This tripping unit shall be connected to the measuring points provided to ensure the temperature class stipulated for the plant is observed.

### 3 Transport



- Any lifting tackle included in the scope of supply must only be used for pump installation.
- **Do not suspend the pump by the motor cable.**
- Transport of the pumps requires proper preparation and handling.
- The lifting chain or rope must always be safely attached to the pump and the lifting gear.
- Always use the pump handle for lifting the unit (see drawing below).
- Chains supplied by KSB must only be used to lift and transport KSB pumps.
- The number on the sign attached to the pump must match the number on the sign attached to the chain.



### 4 Product description

#### 4.1 General description

KSB submersible motor pumps are floodable, close-coupled units which are not self-priming. The pumps are designed for fully submerged, intermittent operation. They may be operated outside the fluid for short periods of time, until the minimum liquid level R1 (see outline drawing on page 40–44) stipulated by KSB has been reached.

#### 4.2 Designation

The exact pump type is shown on the name plate. Please quote the name plate data in all queries, repeat orders and particularly when ordering spare parts.

#### Explosion-proof model

39 023 10		KSB		SEQUEDIN		F-59320		EX		CE	
Typ		No.		Q		H		m		EN 12050	
P2		kW		1/min		A cos φ		V		Hz	
IP68		SI		I/A		kg		Class F			
ACHTUNG		ATTENTION		WARNING		Nicht unter Spannung öffnen.		No abrir bajo tensión.		Do not open while energized.	

Pump type

Works number  
Ident. number

Motor number

Ident. number  
ATEX:

#### Key to designation:

Amarex® N S 32 - 160 / 0 2 YL - G - 160

Type series \_\_\_\_\_  
 Impeller type \_\_\_\_\_  
 S = cutter \_\_\_\_\_  
 Ø discharge nozzle (mm) \_\_\_\_\_  
 Ø size of hydraulics \_\_\_\_\_  
 Motor size \_\_\_\_\_  
 Number of poles \_\_\_\_\_  
 Motor design \_\_\_\_\_  
 YL = explosion-proof (40 °C) \_\_\_\_\_  
 Material variant \_\_\_\_\_  
 G = cast iron \_\_\_\_\_  
 Impeller diam. (mm) \_\_\_\_\_

#### 4.3 Design details

##### 4.3.1 Drive

The electrical data is given on the name plate. Motor design to DIN/VDE 0530 Part 1/IEC 34-1, thermal class F, enclosure IP 68 for the complete pump in acc. with DIN VDE 0470 Part 1 and IP 58 for the electrical equipment in acc. with DIN/VDE 0530 Part 5 (EN 60 034, EN 60 034-1), d.o.l. starting. **Motors in explosion-protected design in acc. with EN 60 079-0/EN 60 079-1, (type of pump protection Ex d IIB T4).**

##### 4.3.2 Shaft seal and bearings

Shaft sealing is effected by means of a (motor end) shaft seal ring and a (pump end) mechanical seal. An oil reservoir between the shaft seal ring and the mechanical seal provides cooling and lubrication. The pump is equipped with maintenance-free rolling element bearings.

### 5 Installation at site



#### 5.1 Safety regulations

It is not permitted for any person to enter the tank during operation of the pump unless special safety precautions have been taken in accordance with current safety regulations.

#### 5.2 Checks to be carried out prior to installation and commissioning

All structural work required must have been prepared in accordance with the dimensions stated in the outline drawing (page 40–44).

The concrete foundations shall have sufficient strength to ensure safe and functional installation (min. 32.5 N as per EN 197-1 or equivalent standard).

#### 5.3 Installation of the pump

Prior to installation, inspect the pump set and the electric cables for damage. Make sure that there is no foreign matter inside the pump. Make sure that the impeller turns smoothly. KSB's scope of supply includes a separate name plate, which shall be kept in the vicinity of the pumping system.

##### 5.3.1 Verification of operating data

Prior to installation the data on the name plate shall be checked against the purchase order data and system data.

### 5.3.2 Checking the oil level

The oil reservoir is filled at the factory with environmentally-friendly, non-toxic paraffin oil of medical quality.



Before commissioning the unit, check the oil level and correct, if necessary (see section 7.2.4).

### 5.3.3 Stationary installation – guide wire arrangement

#### 5.3.3.1 Description

Guided securely along two guide wires, the pump slides into the sump or tank and attaches itself automatically to the duckfoot bend which has been fitted to the floor. A joint ring between the pump and the duckfoot bend and the weight of the pump itself achieve a tight connection.

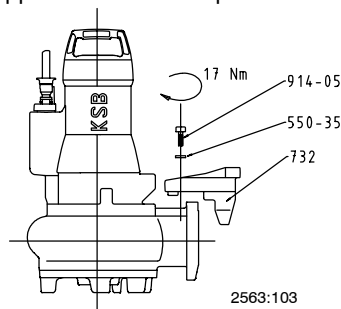
(See outline drawing page 40–44).

#### 5.3.3.2 Installation of guide assembly

For the installation please refer to the general arrangement drawing on page 38.

The chain or lifting rope must be attached on the same side as the electric cable.

1. Fit claw 732 in accordance with the sketch below and the drawing supplied with the clamp.



2. Use steel anchor bolts 90-3.37 to fasten mounting bracket 894 to the edge of the sump opening. For information on holes to be drilled please refer to the outline drawings on page 40–44 Tightening torques are given in **Table 1**.
3. Place threaded rod 59-22 and guide wire suspension bracket 571 onto the mounting bracket. Do not tighten nuts 920.36 too much in order to allow sufficient play to then tighten the wire 59-24.01. Fit the two clamping pieces 572.
4. Duckfoot bend 72-1 shall be positioned and secured on the sump floor so that the guide wire will run roughly vertically after tightening. (A slight incline of up to 5° is permitted.) The duckfoot bend is fastened to the sump floor with steel anchor bolts 90-3.38. Tightening torques are given in **Table 1**.

Insert one end of the guide wire into clamping pieces 572. Run the wire around the duckfoot bend 72-1 and back to the clamping piece. Insert the other end of the guide wire into the clamping pieces. Tighten wire by hand and tighten the clamping pieces.

Pull the wire taught by tightening nut 920.36 with the torque given in **Table 2**. Secure with a second nut.

The loose cable ends at the clamping pieces 572 can either be twisted into a ring or the end can be cut off. After length adjustment, tape the ends to avoid fraying.

Attach hook 59-18 to the mounting bracket for attaching the lifting chain (rope) at a later stage.

**Table 1:** Tightening torques for steel anchor bolts

Size	Tightening torque (Nm)
10	10

**Table 2:** Guide wire tightening (P)

Size	Tightening torque	P (N)
32-160	7	3 000

#### 5.3.3.3 Installation of the pump

Guide the pump over guide wire suspension bracket 571. Thread the pump onto the guide wire and and lower it slowly into the sump.

Attach lifting chain/rope to hook 59-18 on the mounting bracket.

### 5.3.4 Stationary installation - guide rail arrangement with 1 or 2 guide rails

#### 5.3.4.1 Description

Guided securely along one or two guide rails, the pump slides into the sump or tank and attaches itself automatically to the duckfoot bend which has been fitted to the floor. A joint ring between the pump and the duckfoot bend and the weight of the pump itself achieve a tight connection.

(See outline drawing page 40–44).

#### 5.3.4.2 Installation of guide assembly

For the installation please refer to the general arrangement drawing on page 38.

The lifting chain (rope) must be attached on the same side as the electric cable.

1. Fit claw 732 (see 5.3.3.2 – 1).
2. Position duckfoot bend 72-1 on the sump floor. Insert the guide rail into its location at the top of the duckfoot bend.
3. Cut the guide rail(s) to the appropriate length.
4. Insert the other end of the guide rail(s) into mounting bracket 894 and mount the latter on the edge of the sump opening with steel anchor bolts 90-3.37. For information on holes to be drilled please refer to the outline drawings on page 40–44 Tightening torques are given in **Table 1**.
5. The duckfoot bend must be positioned on the sump floor so that the guide rail(s) run vertically.
6. Use steel anchor bolts 90-3.38 to fasten the duckfoot bend. Tightening torques are given in **Table 1**.

#### 5.3.4.3 Installation of the pump

Guide the pump over mounting bracket 894 from above and slowly lower it down the rail(s). Attach chain 885 to hook 59-18.

### 5.3.5 Stationary installation – hoop arrangement

#### 5.3.5.1 Description

Guided securely along a guide hoop, the pump slides into the sump or tank and attaches itself automatically to the duckfoot bend which has been fitted to the floor. A joint ring between the pump and the duckfoot bend and the weight of the pump itself achieve a tight connection.

(See outline drawing page 40–44).

### 5.3.5.2 Installation of guide assembly

For the installation please refer to the general arrangement drawing on page 38.  
The lifting chain (rope) must be attached on the same side as the electric cable.

1. Fit claw 732 (see 5.3.3.2 – 1).
2. Insert the guide hoop ends into their locations on duckfoot bend 72-1.
3. Fasten the duckfoot bend to the tank floor with steel anchor bolts 90-3.38. Tightening torques are given in **Table 1**.

### 5.3.5.3 Installation of the pump

Guide the pump over the guide hoop from above and slowly lower it into the sump.  
Provide suitable means of attachment for the lifting chain (rope) on the sump edge.  
The pump attaches itself automatically to the duckfoot bend.

## 5.3.6 Transportable model

### 5.3.6.1 Description


Transportable pump models are fitted with pump feet.  
For other accessories please contact our sales offices. (See outline drawing page 40–44).

### 5.3.6.2 Installation

For the installation please refer to the general arrangement drawing on page 38.  
The lifting chain (rope) must be attached on the same side as the discharge nozzle.  
Undo screws 914.03 and push pump feet 182 into the openings in the suction cover.  
Retighten the screws: tightening torque 7.3 Nm.  
The pump shall always be placed in vertical position (motor on top) and on solid ground.

## 5.4 Connecting the piping


(See outline drawing page 40–44).

 Connect the discharge pipe to the pump without transmitting any stresses or strains.  
Never use the pump and the duckfoot bend as an anchorage point for the pipeline.  
Thermal expansions of the pipelines must be compensated by appropriate measures so as not to impose any extra loads on the pump exceeding the permissible pipeline forces and moments.

### Danger to life when toxic or hot fluids are handled!

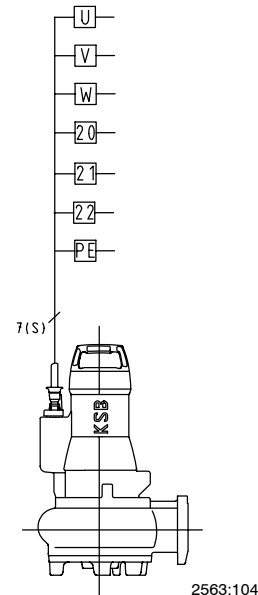
A swing check valve shall be fitted in long riser pipes, in order to prevent drainage of the discharge line after the pump is switched off. Choose the position of the swing check valve so that the sump can still be properly vented.

## 5.5 Connection to power supply


 Connection to the power supply must be effected by a trained electrician only and in compliance with local regulations.  
The available mains voltage must correspond to the voltage stated on the name plate.

### Conductor marking

Connection in the control cabinet	Standard H07RN8-F 7G 1.5 <sup>2</sup>
PE (earth conductor)	green/yellow
U (phase)	1
V (phase)	2
W (phase)	3
20	4
21	5
22	6



The individual conductors are marked at the cable end.  
If cables have to be shortened, make sure the markings are transferred correctly. The electrical installation must be in accordance with IEC 364.

 In potentially explosive atmospheres, all electrical connections to the power supply cable must meet explosion protection requirements.

## 5.5.1 Monitoring equipment

### 5.5.1.1 Temperature monitoring

#### Description of winding temperature monitoring on explosion-proof models (YL)

The winding is protected against overheating by two independent monitoring circuits.

The first monitoring circuit (bimetal switch as temperature control device, conductor marking 20, 21) trips the pump at cut-out temperature and re-starts it automatically when the motor has cooled down.

In the event the first temperature monitoring circuit should fail, the second monitoring circuit (bimetal switch as temperature limiter, conductor marking 21, 22) will trip the pump before the winding temperature limit stipulated for the explosion-proof status of the unit is exceeded. Automatic reset and start-up is not permitted in this case.

A special tripping unit "T" (see illustration below) with manual reset is required.

The tripping unit "T" must be installed in the control cabinet.  
Alternatively, commercially available components can be used for installing a monitoring circuit.  
After the unit has been tripped by the thermal cut-outs, the pump needs to be overhauled.

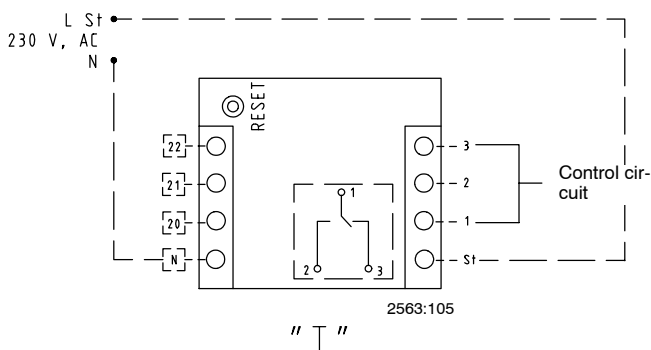
The pumps will only satisfy explosion protection requirements if the built-in temperature switches (temperature control and temperature limiting devices) are connected in the control cabinet in accordance with the wiring diagram below.

Winding temperature sensor = bimetal switch (NC) in the motor winding

Max. operating voltage of switch 250 V,

max. switching current 2 A at  $\cos \varphi = 1$

Conductor marking 20, 21, 22



"T": tripping unit (optional supply)  
(Ident. No. 01 040 217)

#### 5.5.1.2 Motor control / humidity cutout

The Amarex N S 32-160 pump is not equipped with an integrated humidity sensor. No design variants are planned for Amarex N S 32-160.

#### 5.5.2 Frequency inverter operation

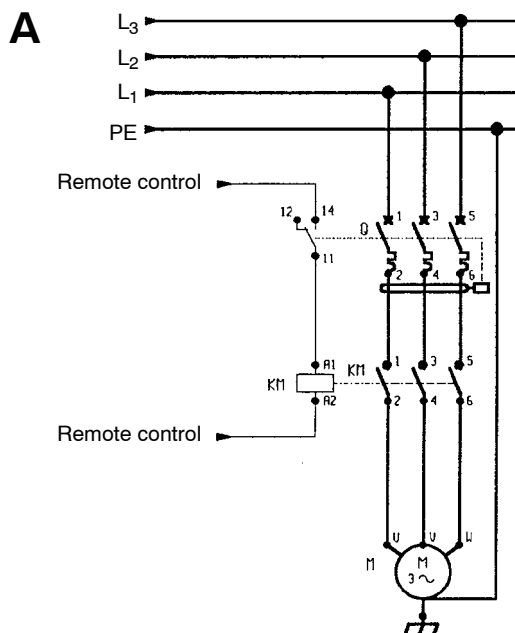
The Amarex N S 32-160 pump must not be operated with a frequency inverter.

#### 5.5.3 Routing the electric cables

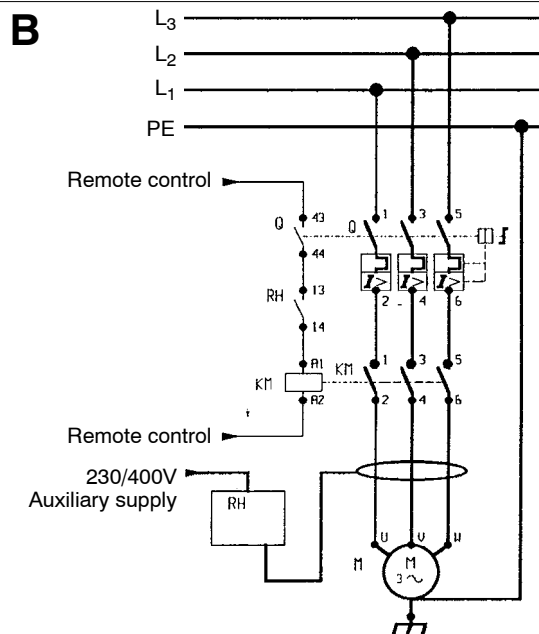
After the pump set has been installed, the power cable should be led upwards with as little slack as possible to prevent damage caused by flow-induced motion.

#### 5.5.4 Overload protection

The motor must be protected against overloading by a thermal time-lag overload protection device in accordance with VDE 0660. This device must be set to the rated motor current, which is indicated on the name plate.

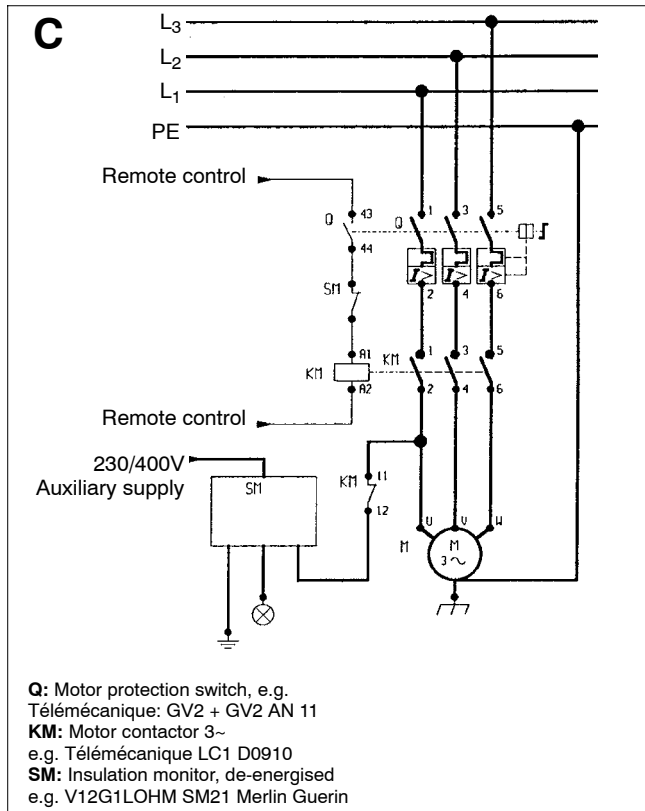


**Q:** Residual current device 3~ 30 mA  
e.g. earth leakage circuit breaker Merlin Guérin C60 L  
trip-characteristic K (DIN)  
- Earth leakage module VIGI, instantaneous, 3~ 30 mA  
- Auxiliary contact (change-over contact)  
**KM:** Motor contactor 3~  
e.g. Télémécanique LC1 D0910



**Q:** Motor protection switch  
e.g. Télémécanique GV2M + GV2AN11  
**KM:** Motor contactor 3~  
e.g. Télémécanique LC1 D0910  
**RH:** Earth leakage protection relay with separate toroid  
e.g. Vigirex RH 328 A Merlin Guérin + toroid





### 5.5.5 Float switch

For automatic pump operation, the stop level of the float switch must be set to a level above dimension R1/R2 (see outline drawings on page 40–44).

### 5.5.6 Checking the direction of rotation




**Never insert your hands or any other objects into the pump!**

An arrow on the pump casing shows the correct direction of rotation. If the phase sequence of the mains is known, connection in acc. with section 5.5. will automatically result in the correct direction of rotation of the pump.

Do not run the pump unit for more than 3 minutes when checking the direction of rotation.

Check the direction of rotation by switching on the unit and switching it off again immediately. (Observe impeller through the opening below the volute casing)

Dry running will result in increased wear and must be avoided. If the pump runs in the wrong direction of rotation, interchange two of the three phases in the control cabinet.

 If the explosion hazard also exists during the installation phase, the direction of rotation must never be checked by starting up the unfilled pump unit, even for a short period, to prevent temperature increases resulting from contact between rotating and stationary components. The rotation check must be performed outside the potentially explosive atmosphere.

### 5.5.7 Potential equalisation

Potential equalisation shall be provided for in compliance with EN 60 204.

The pump casing is designed with a female thread for an M8 hex. socket head cap screw.

### Special requirement for chemically corrosive fluids:



If an explosion-proof pump unit is used in chemically corrosive fluids, the terminal provided on the outside of the pump unit must not be used.

Instead, the PE conductor shall be connected to a flange of the discharge pipe which is not in contact with the fluid handled.

Make sure that electrical contact is established between the newly created potential equalisation connection and the pump.

## 6 Commissioning, start-up/shutdown

Do not use the pump for fluids to which its materials are not resistant.

Before starting up the pump make sure that the following points have been checked and carried out in acc. with sections 5.3, 5.4 and 5.5.

### Make sure to check:

- the operating data
- the direction of rotation
- the electrical connections
- the correct installation of the pump



The pump must be completely filled with the fluid handled to ensure that an explosive atmosphere is reliably prevented.

The pump shall only be operated in such a way that air ingress into the pump casing is not possible.

### 6.1 Commissioning, start-up



Before starting up the pump, make sure that the fluid level can never drop below dimension R3. (See outline drawing page 40–44).

For continuous operation (S1) the pump must be fully submerged.

#### Caution

If there is any danger of the pump running dry, remove screwed plug 903 from the pump casing (see exploded view, page 46).

**Operation outside the fluid will result in increased wear and must be avoided!**

#### 6.1.1 Intake of suspended solids

Pumps with cutter are often used for water containing sludge and suspended solids. In such cases, we recommend using an inclined claw. Please note that after reaching the minimum suction height, pumps with cutter should remain in operation under the same conditions for approximately 10 seconds.

#### Caution

Operation up to the bottom edge of the pump casing is permissible (see dimension RS in the outline drawings, pages 40–44). If dimension RS is observed, the pump is always in contact with the fluid handled.

Excessive switching frequencies of the pump shall be avoided.



**Never allow an explosion-proof pump to run dry!**

#### 6.1.2 Fluid temperature

Explosion-proof model (YL) max. 40 °C.



Responsibility for compliance with the specified fluid temperature (operating temperature) lies with the plant operator. The max. permissible fluid temperature depends on the temperature class to be complied with.

**The pump must not be operated at temperatures exceeding the ones stated above.**

#### 6.1.3 Switching frequency

Maximum number of start-ups per hour: 30

### 6.1.4 Operating voltage

Maximum admissible deviation of operating voltage:

±10 % for explosion-proof models

The maximum permissible voltage difference between the individual phases is 1 %.

### 6.1.5 Density of the fluid pumped

Max. density: 1.1. For higher densities please contact KSB.

## 6.2 Shutdown/storage/preservation

### 6.2.1 Storage of new pumps

- Store the pump in a dry location in upright position and in its original packaging. Support the electric cable at the cable entry to prevent permanent deformation.
- Spray-coat with oil the inside wall of the pump casing and in particular the impeller clearance areas, and close the pump nozzles (e.g. with plastic caps or similar).

### 6.2.2 Measures to be taken for prolonged shutdown

#### 6.2.2.1 The pump remains installed

In order to make sure that the pump is always ready for instant start-up, start the pump set regularly once every 3 months for a short time (approx. 1 minute). Before doing so, make sure that the fluid level in the sump or tank is above R1/R2.

#### 6.2.2.2 The pump is removed from the sump and stored

Before putting the pump into storage, carry out all checks and maintenance work specified in sections 7.1 and 7.2. Then apply preservatives as described in section 6.2.1.

## 7 Servicing/maintenance

### 7.1 General instructions

A regular maintenance schedule will help avoid expensive repairs and contribute to trouble-free, reliable operation of the pump with a minimum of maintenance expenditure and work.



**Work on the unit must only be carried out with the electrical connections disconnected (incl. control cable).**



Pumps handling fluids posing health hazards must be decontaminated. When draining the fluid see to it that there is no risk to persons or the environment. All relevant laws must be heeded.

### 7.2 Servicing/inspection

**Servicing and maintenance work shall include the measures listed in the table below. The work shall be performed by qualified personnel only!**

§	Servicing operations	Service interval
7.2.1	Insulation resistance test	Every 4000 h, but at least once a year
7.2.2	Checking the power cable	
7.2.3	Checking the monitoring devices	
7.2.4	Oil change	
7.4.3		
7.2.5	Bearings and lubrication	Every 5 years
7.2.6	Visual inspection of lifting chain / guide wire	
	General overhaul	

In difficult operating conditions, maintenance intervals must be reduced.

### 7.2.1 Insulation resistance test

Measurements must be taken at the cable ends (disconnected in the control cabinet).

Measuring voltage: max. 500 V d.c.

The insulation resistance measured between phase and earth must not be less than **5 MΩ**. If the resistance measured is lower, cable and stator resistance must be measured separately to locate the defect.

Measure cable resistance:

- between phase and earth
- between temperature sensors and earth

If the insulation resistance for the power cable is less than **5 MΩ**, the power cable is defective and must be replaced.

Measure motor resistance:

- between phase and earth
- between temperature sensors and earth

If the insulation resistance of the motor is lower than **5 MΩ**, the winding is defective. We recommend to contact the motor manufacturer or KSB Service.

### 7.2.2 Checking the power cable

- Visual inspection

If the cable shows mechanically or chemically induced damage such as scratches or blisters, the complete cable must be replaced.

- Checking the earth conductor

In a 10-metre cable, the resistance between the earth conductor and earth must be less than 1 Ω.

### 7.2.3 Checking the monitoring devices

#### 7.2.3.1 Temperature monitoring

- In a 10-metre cable, the resistance between conductor ends 20 and 21 as well as 21 and 22 must be less than 1Ω.

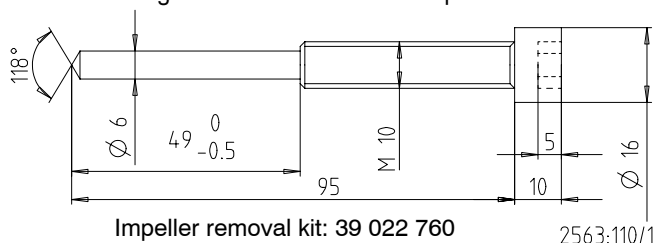
### 7.2.4 Oil change

#### 7.2.4.1 Draining the oil

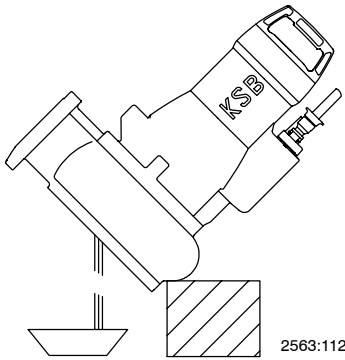
When dismantling the motor section and the power cable make sure that the conductors are clearly marked for future reassembly.

For disassembly, please refer to the sectional drawing on page 45.

1. Remove suction cover 162.
2. Undo and remove impeller fastening screw M8. The impeller/shaft connection is a tapered fit.
3. For dismantling the impeller, an M10 jacking thread is provided at the impeller hub. Screw in the jack as shown in the drawing below and remove the impeller.



4. Push mechanical seal 433.02 along the shaft.
5. Drain off the oil (see drawing below).



– Place a suitable vessel under the screwed plug.  
Paraffin oil is bright and transparent in appearance. A slight discoloration, caused by the running-in process of new mechanical seals or small amounts of leakage from the fluid pumped, has no detrimental effect. However, if the oil fill is severely contaminated by the fluid pumped, this would suggest a defect on the mechanical seal. In this case, the mechanical seal must be replaced.



- Regional regulations in force at the place of installation must be adhered to.
- The oil fill must not contaminate the fluid handled.
- Please observe the local laws applicable to the disposal of such substances.

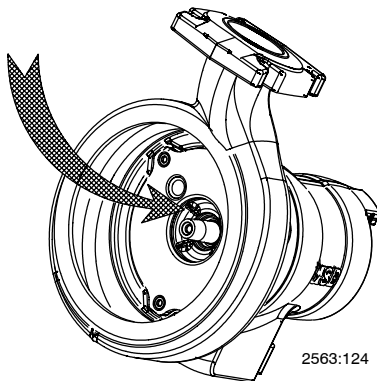
#### 7.2.4.2 Filling in oil

Position pump as illustrated below. Fill in oil (quantity: **0.18 l**).

##### Recommended oil quality:

Paraffin oil, thin-bodied, HAFA CLAREX OM, Merck No. 7174 or equivalent non-toxic oil (type Codex).

Alternatively, all non-doped and doped motor oils of grade SAE 10W to SAE 20W can be used. Please observe the local laws applicable to the disposal of such substances.



Clean all dismantled components and check them for signs of wear. Damaged or worn components are to be replaced by **original spare parts**. Make sure that the seal faces are clean and that the sealing elements are properly fitted. New sealing elements should be used whenever the pump is reassembled. Reassembly is effected in reverse order to dismantling in compliance with the sectional drawing and list of components.

#### 7.2.5 Bearings and lubrication

The shaft must be easy to turn by hand, without any noise.

#### 7.2.6 Visual inspection of lifting chain (rope) / guide wire

During maintenance work the lifting chain (lifting rope), the guide wire and their points of attachment at the pump shall be inspected for damage. Damaged components shall be replaced by original spare parts.

#### 7.3 Environmental protection / Drainage / Disposal



If the pump has been used for handling fluids posing health hazards, see to it that there is no risk to persons or the environment when draining the fluid. All relevant laws must be heeded.

#### 7.4 Dismantling the pump

For disassembly, please refer to the sectional drawing on page 45.

##### 7.4.1 General instructions

Repair and maintenance work must only be performed by specially trained personnel.



Observe the safety regulations laid down in section 7.1. For explosion-proof motors, also ensure compliance with section 7.4.2.

In case of damage you can always contact our service departments.

##### 7.4.2 Dismantling the pump



##### ATTENTION

After the pumps has been separated from the voltage supply, please wait at least 5 minutes before opening the pump.

##### 7.4.2.1 Dismantling the hydraulic system

See section 7.2.4.1.

##### 7.4.2.2 Dismantling of mechanical seal and motor

When dismantling the motor section and the power cable make sure that the conductors are clearly marked for future reassembly.



Any repair work on explosion-proof components and any work affecting the explosion-proof status of the unit, such as re-winding, repair work in the motor section, etc. must be performed by the manufacturer or – if this is not possible – approved by an authorised expert.

1. Push mechanical seal 433.02 along the shaft.
2. Drain off the oil (see section 7.2.4.1).



The following steps shall be checked for approval by an authorised ATEX expert.

3. Undo and remove screws 914.02 on bearing bracket 330.
4. Remove rotor unit 818 from bearing bracket 330.
5. Push mechanical seal 433.02 out of bearing bracket 330.
6. Remove circlip 932.02.
7. Take bearing bracket 330 off rotor 818.
8. Remove shaft seal ring 420.
9. Remove circlip 932.01.
10. Extract rolling element bearing 321.02.
11. Remove baffle 17-5.
12. Extract rolling element bearing 321.01.

#### 7.5 Reassembly of pump

##### 7.5.1 General instructions

Clean all dismantled components and check them for signs of wear. Damaged or worn components are to be replaced by **original spare parts**. Make sure that the seal faces are clean and that the sealing elements are properly fitted. New sealing elements should be used whenever the pump is reassembled. Reassembly is effected in reverse order to dismantling in compliance with the sectional drawing and list of components.

For filling the oil reservoir, please refer to section 7.2.4.2.  
All screws and bolts must be properly tightened during assembly.  
Tightening torque: M6 7.3 Nm, M8 17 Nm except for impeller screw 30 Nm

### 7.5.2 Fitting the motor

Before fitting explosion-proof motors make sure that the special requirements outlined in section 7.4.2.2. have been met during any repair work.

All motors must be subjected to the electric tests indicated in sections 6.1, 6.2 and 7.2.

### 7.5.3 Fitting the mechanical seal

Please observe the following when fitting the mechanical seal:

- Extreme care and cleanliness are of utmost importance.
- The surface of the shaft must be absolutely clean and undamaged.
- Before reassembly, the contact faces shall be wetted with a drop of oil. When sliding on the mechanical seal, wet the inside diameter with soapy water (no oil) and protect the mechanical seal from damage.

Fitting the mechanical seal:

To prevent damage to the rubber bellows by the shaft recess, place a thin foil (approx. 0.1 ... 0.3 mm) around the free shaft stub. Slip the rotating assembly over the foil into its installation position. Then remove the foil.

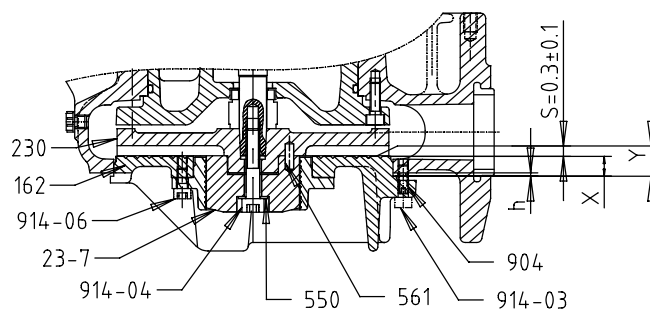
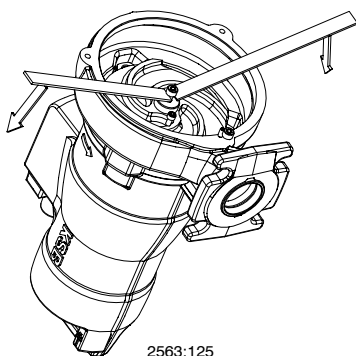
### 7.5.4 Fitting the S-type impeller (cutter)

After installation of the mechanical seal 433.02:

1. Slip the impeller onto the shaft end
2. Place grooved pin 561 into the impeller
3. Place impeller body 23-7 onto the centring hub
4. Screw in impeller screw 914.04 by hand
5. Tighten the screw (tightening torque 30 Nm)
6. Mount ring 500 with screws 914.06 in suction cover 162
7. Measure dimension X on the suction cover
8. Measure dimension y between the impeller vanes and the pump casing, see **Caution**
9. Use screws 904 to set dimension  $h = x + s - y$ , where  $s$  ( $0.3 \pm 0.1$ ) is the clearance between the suction cover and the impeller vanes.
10. Tighten the suction cover with screws 914.03.

#### Caution

The clearance dimension "s" is only valid if the rotor assembly is pulled towards the suction cover until it will not go any further (see drawing below). Use utmost care to perform this step. The rotor must be held in this position until dimension "y" has been measured.



### 7.5.6 Tightness test of oil reservoir

A tightness test is not required.

### 7.5.7 Filling the oil reservoir

See section 7.2.4.2.

### 7.6 Spare parts stock



For explosion-proof units only marked original spare parts supplied by the manufacturer of the pump unit shall be used.

**When ordering spare parts please always quote the following data stated on the name plate.**

Pump type:

e.g. Amarex® N

Works number / identification number and serial number.

### 7.6.1 Recommended spare parts stock for 2 years' operation as per VDMA

Part No.	Description	Number of pumps (incl. stand-by pumps)						
		2	3	4	5	6	8	10 and more
230	Impeller	1	1	2	2	3	4	50 %
321	Rolling element bearing, motor end	1	1	2	2	3	4	50 %
321	Rolling element bearing, pump end	1	1	2	2	3	4	50 %
420	Shaft seal ring, motor end	2	3	4	5	6	7	90 %
433	Mechanical seal, pump end	2	3	4	5	6	7	90 %
99-9	Set of sealing elements	4	6	8	8	9	10	100 %

## 8 Trouble-shooting

Fault	Cause	Remedy
<b>Pump is running, but does not deliver.</b>	Motor is not running because of lack of voltage.	Check electrical connections.
	Motor is running on two phases only.	Replace the defective fuse. Check the electric cable connections.
	Motor winding or electric cable are defective.	Replace stator and/or electric cable by original spare parts.
	The temperature switch monitoring the winding has tripped the pump because of excessive temperature rise in the winding.	The motor will restart automatically once the unit has cooled down.
	Tripping unit with manual reset for temperature limiter has tripped the pump as a result of the permissible winding temperature being exceeded.	Inspect the pump.
	Gate valve in discharge pipe closed or blocked, swing check valve blocked.	Check gate valve, open and/or clean, if necessary. Clean the swing check valve.
	Pump intake clogged by deposits.	Clean the intake, pump components and swing check valve.
	Pump or piping are not completely vented.	Vent by lifting the pump off the duckfoot bend and lowering it again.
<b>Pump delivers insufficient flow rate.</b>	Wrong direction of rotation.	Interchange two of the phases of the power supply cable.
	Motor is running on two phases only.	Replace the defective fuse. Check the electric cable connections.
	Gate valve in the discharge line is not fully open.	Fully open the gate valve.
	Clogged impeller.	Remove deposits in the pump.
	Wear of internal pump parts.	Replace worn components by new ones.
	Gate valve in discharge pipe closed or blocked, swing check valve blocked.	Check gate valve, open and/or clean, if necessary. Clean the swing check valve.
	The fluid contains air or gas.	Contact KSB.
	Water level lowered too much during operation.	Verify system data and sizing / Check switching points of the pump.
<b>Excessive power consumption.</b>	Wrong direction of rotation.	Interchange two of the phases of the power supply cable.
	Operating voltage is too low.	Check mains voltage and cable connections.
	Pump is running in the off-design range.	Check the pump's operating data.
	Impeller does not turn easily.	Clean the hydraulic system.
	Wear of internal pump parts.	Replace worn components by new ones.
	Defective ball bearing in the motor.	Contact KSB.
<b>Vibrations and noise during pump operation.</b>	Wrong direction of rotation.	Interchange two of the phases of the power supply cable.
	Pump is running in the off-design range.	Check the pump's operating data.
	Clogged impeller.	Remove deposits in the pump.
	Impeller does not turn easily.	Check whether the impeller can be easily rotated; clean the hydraulic system, if required.
	Wear of internal pump parts.	Replace worn components by new ones.
	The fluid contains air or gas.	Contact KSB.
	System-induced vibrations.	Contact KSB.
	Defective ball bearing in the motor.	Contact KSB.

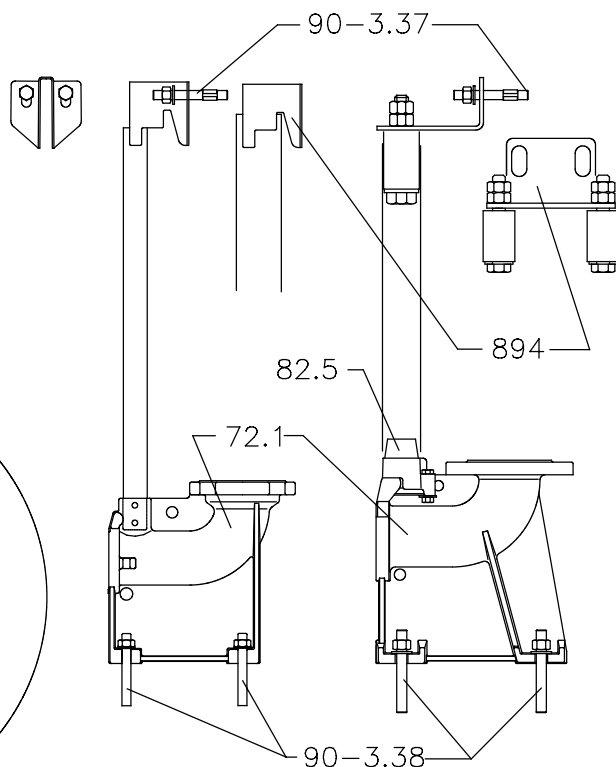
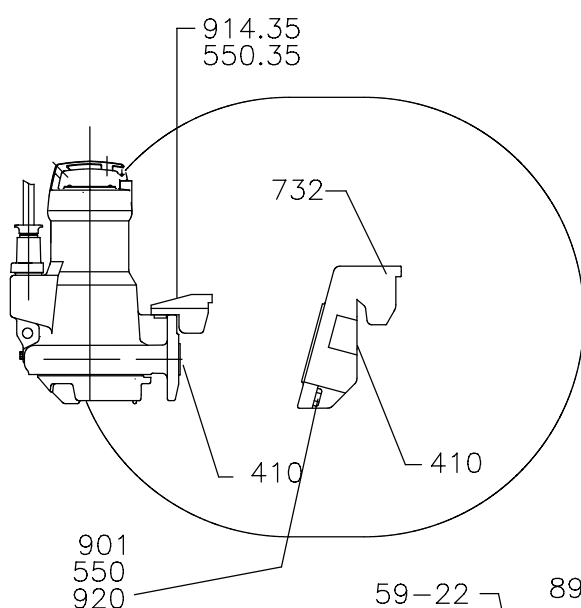
**Please note:** Work on the pump's internal parts during the warranty period is only permitted after prior consultation with the manufacturer.

9 Anhang / Annex / Annexes

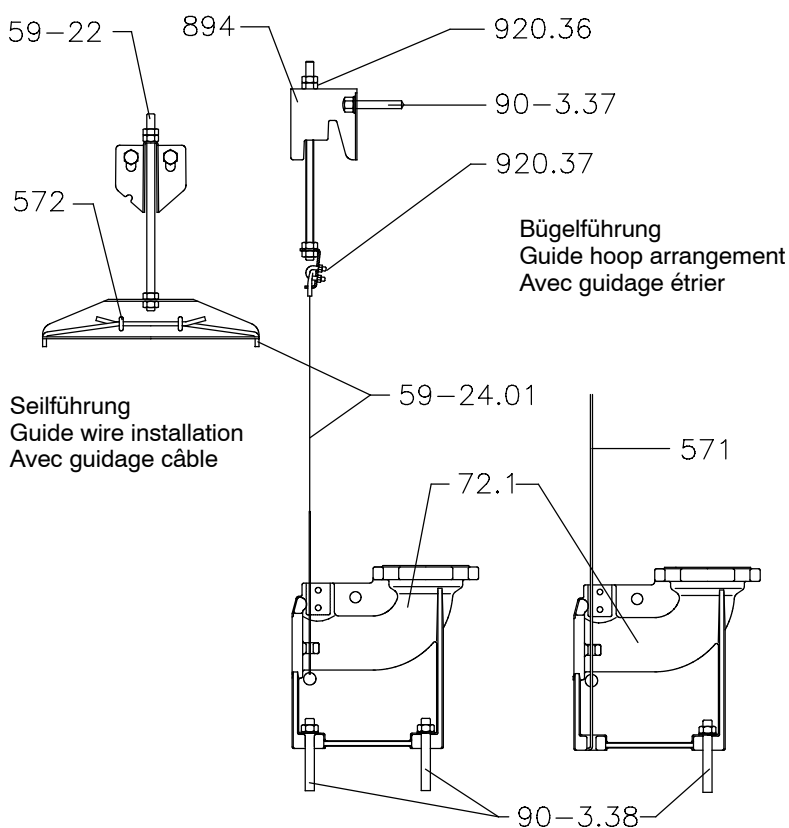
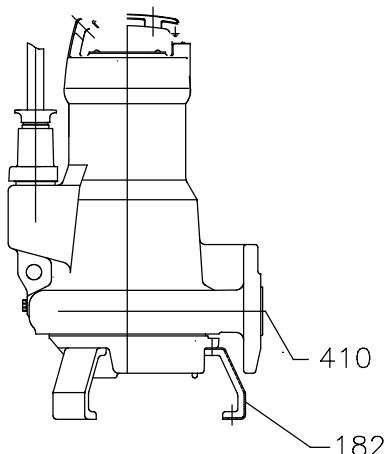
**Aufstellungsplan - Nassaufstellung**  
**General arrangement drawing -**  
**wet-well installation**  
**Plan d'installation noyé**

1-Stangenführung  
 Arrangement with 1 guide rail  
 Avec guidage 1 barre

Doppelstangenführung  
 Twin guide rail arrangement  
 Avec guidage 2 barres



Transportable Nassaufstellung  
 Transportable wet-well installation  
 Version transportable noyée



Bügelführung  
 Guide hoop arrangement  
 Avec guidage étrier

Seilführung  
 Guide wire installation  
 Avec guidage câble

## D

Teile-Nr.	Teile-Benennung
59-22	Gewindestange
59-24.01/02	Seil
72-1	Flanschkrümmer
82-5	Adapter
90-3	Dübel
182	Füße
410	Profildichtung
550	Scheibe
571	Bügel
572	Spannbügel
732	Halterung
894	Konsole
901	6kt-Schraube
914	Innen-6kt-Schraube
920	Mutter

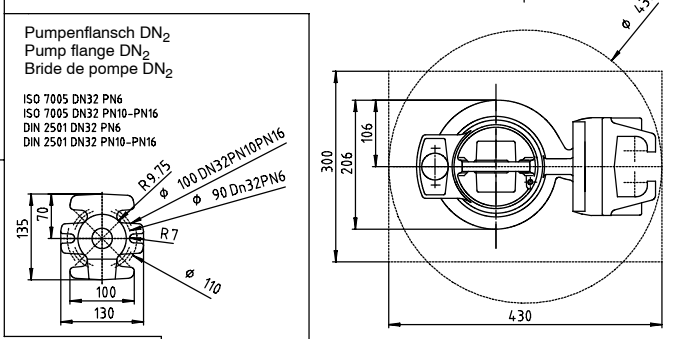
## GB

Part no.	Part description
59-22	Threaded rod
59-24.01/02	Wire
72-1	Duckfoot bend
82-5	Adapter
90-3	Anchor bolt
182	Foot
410	Profile joint
550	Disc
571	Guide wire suspension bracket
572	Clamping piece
732	Claw
894	Bracket
901	Hex. head bolt
914	Socket head cap screw
920	Nut

## F

Repère	Désignation
59-22	Tige filetée
59-24.01/02	Câble
72-1	Pied d'assise
82-5	Adaptateur
90-3	Cheville
182	Pied
410	Joint profilé
550	Rondelle
571	Etrier
572	Etrier de serrage
732	Griffe
894	Console
901	Vis à tête hexagonale
914	Vis à tête cylindrique
920	Ecrou

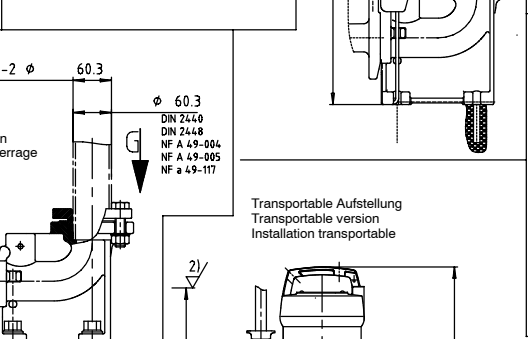
**Stationäre Aufstellung Amarex N S 32-160 mit Doppelstangenführung**  
**Stationary installation Amarex N S 32-160, twin guide rail arrangement**  
**Installation stationnaire Amarex N S 32-160 avec guidage 2 barres**



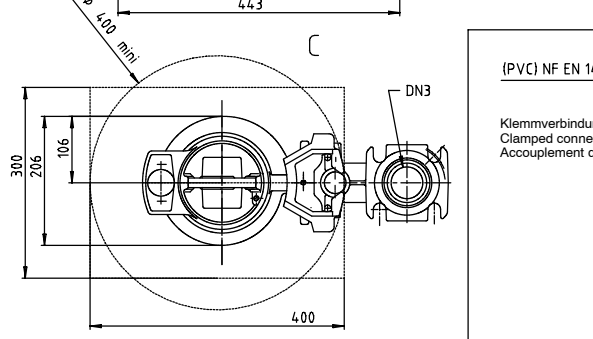
ISO 7005 PN 10-PN 16  
DIN 2501 PN 10-PN 16

N°UG1116935 ind.05

Stationäre Aufstellung Amarex N S 32-160 mit 1-Stangenführung  
Stationary installation Amarex N S 32-160, arrangement with 1 guide rail  
Installation stationnaire Amarex N S 32-160 avec guidage 1 barre



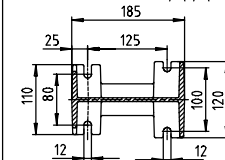
**Stationäre Aufstellung Amarex N S 32-160 mit Seilführung**  
**Stationary installation Amarex N S 32-160, guide wire arrangement**  
**Installation stationnaire Amarex N S 32-160 avec guidage câble**



RS = Tiefster Ausschaltpunkt bei Schlürfbetrieb  
RS = Lowest switch-off point in slur mode  
RS = Point d'arrêt le plus bas en régime de barbotage

$\varnothing$  60.3  
 DIN 2440  
 DIN 2448  
 NF A 49-004  
 NF A 49-005  
 NF a 49-117

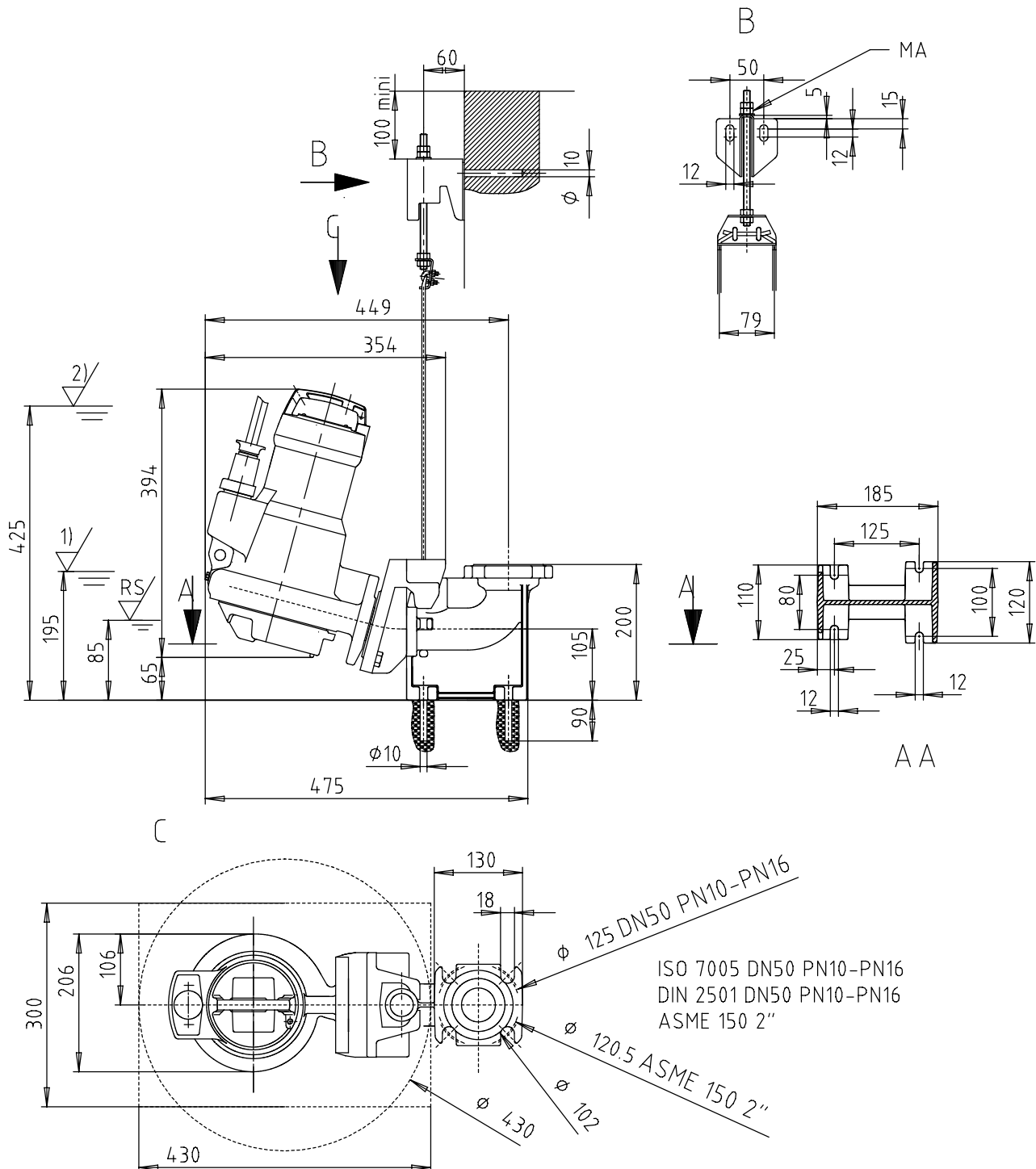
A A





**Stationäre Aufstellung Amarex N S 32-160 mit Seilführung**  
**Stationary installation Amarex N S 32-160, guide wire arrangement**  
**Installation stationnaire Amarex N S 32-160 avec guidage câble**

MA = 14 Nm  
P = 6000 N



- 1) Tiefster Ausschaltpunkt bei Automatikbetrieb  
1) Lowest switch-off point for automatic operation  
1) Point d'arrêt le plus bas en service automatique

- 2) Mindestüberdeckung bei Dauerbetrieb  
2) Minimum submergence for continuous operation  
2) Recouvrement minimal pour service continu

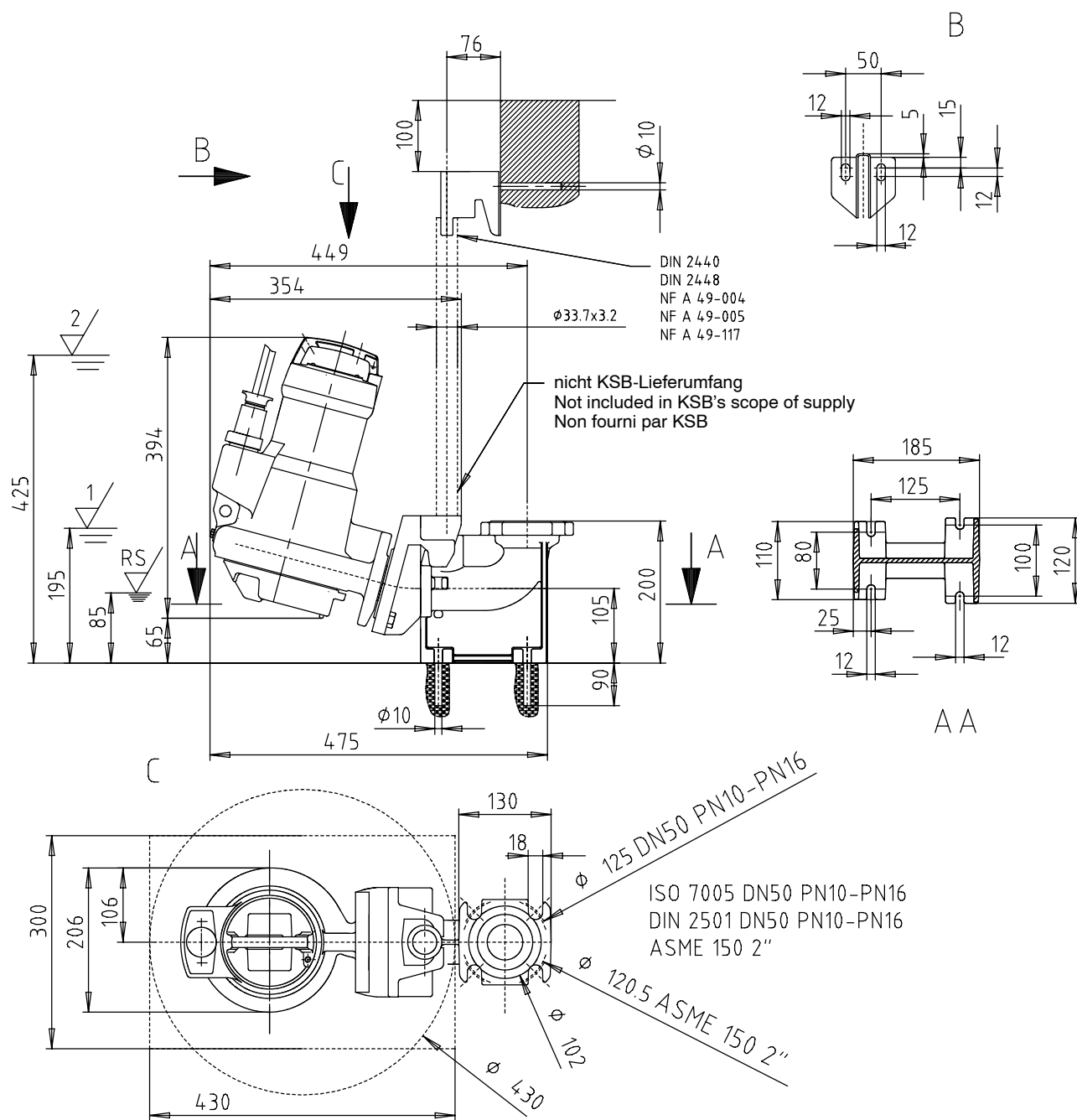
Amarex N S 32-160

Seilführung mit schräger Halterung  
Guide wire arrangement with inclined claw  
Guidage câble avec griffe pentée

RS = Tiefster Ausschaltpunkt bei Schlüßbetrieb  
RS = Lowest switch-off point in slur mode  
RS = Point d'arrêt le plus bas en régime de barbotage

UG1132083 ind.03

**Stationäre Aufstellung Amarex N S 32-160 mit 1-Stangenführung**  
**Stationary installation Amarex N S 32-160, arrangement with 1 guide rail**  
**Installation stationnaire Amarex N S 32-160 avec guidage 1 barre**



1) Tiefster Ausschaltpunkt bei Automatikbetrieb  
 1) Lowest switch-off point for automatic operation  
 1) Point d'arrêt le plus bas en service automatique

2) Mindestüberdeckung bei Dauerbetrieb  
 2) Minimum submergence for continuous operation  
 2) Recouvrement minimal pour service continu

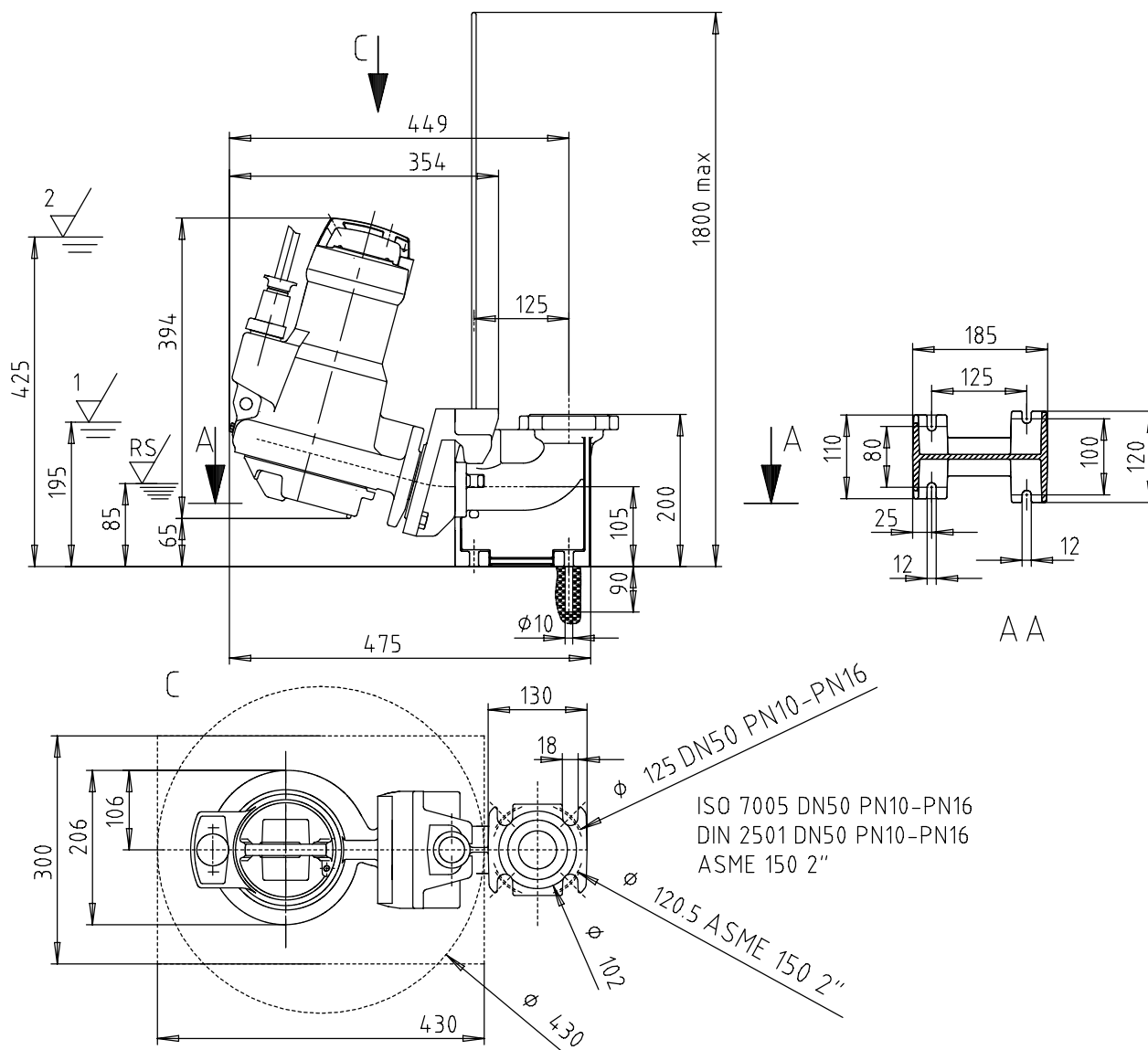
RS = Tiefster Ausschaltpunkt bei Schlüßbetrieb  
 RS = Lowest switch-off point in slur mode  
 RS = Point d'arrêt le plus bas en régime de barbotage

Amarex N S 32-160

1-Stangenführung mit schräger Halterung  
 1-Guide rail arrangement with inclined claw  
 Guidage 1 barre avec griffe pentée

UG1132023 ind.04

**Stationäre Aufstellung Amarex N S 32-160 mit Bügelführung**  
**Stationary installation Amarex N S 32-160, guide hoop arrangement**  
**Installation stationnaire Amarex N S 32-160 avec étrier de guidage**



- 1) Tiefster Ausschaltpunkt bei Automatikbetrieb  
1) Lowest switch-off point for automatic operation  
1) Point d'arrêt le plus bas en service automatique

- 2) Mindestüberdeckung bei Dauerbetrieb  
2) Minimum submergence for continuous operation  
2) Recouvrement minimal pour service continu

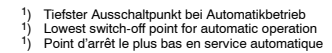
RS = Tiefster Ausschaltpunkt bei Schlüßbetrieb  
RS = Lowest switch-off point in slur mode  
RS = Point d'arrêt le plus bas en régime de barbotage

Amarex N S 32-160

Bügelführung mit schräger Halterung  
Guide wire arrangement with inclined claw  
Guidage étrier avec griffe pentée

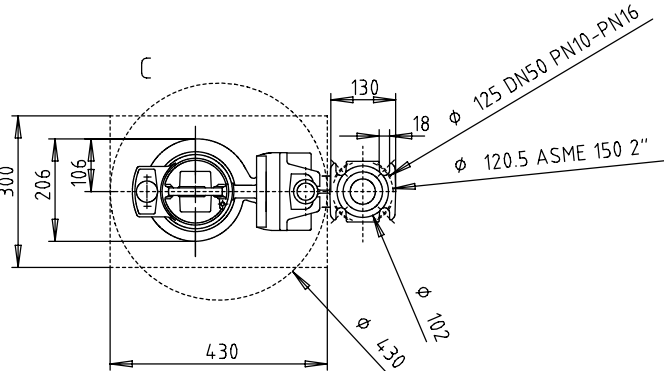
UG1132062 ind.03

Stationäre Aufstellung "Normafeet" Amarex N S 32-160 mit Doppelstangenführung  
Stationary installation normafeet Amarex N S 32-160, twin guide rail arrangement  
Installation stationnaire "Normafeet" Amarex N S 32-160 avec guidage 2 barres



RS Tiefster Ausschaltpunkt bei Schlürfbetrieb  
RS = Lowest switch-off point in slurp mode  
RS = Point d'arrêt le plus bas en régime de barbotage

**Stationäre Aufstellung "Normafeet" Amarex N S 32-160 mit 1-Stangenführung**  
**Stationary installation normafeed Amarex N S 32-160, arrangement with 1 guide rail**  
**Installation stationnaire "Normafeet" Amarex N S 32-160 avec guidage 1 barre**



UG1128722 ind.04

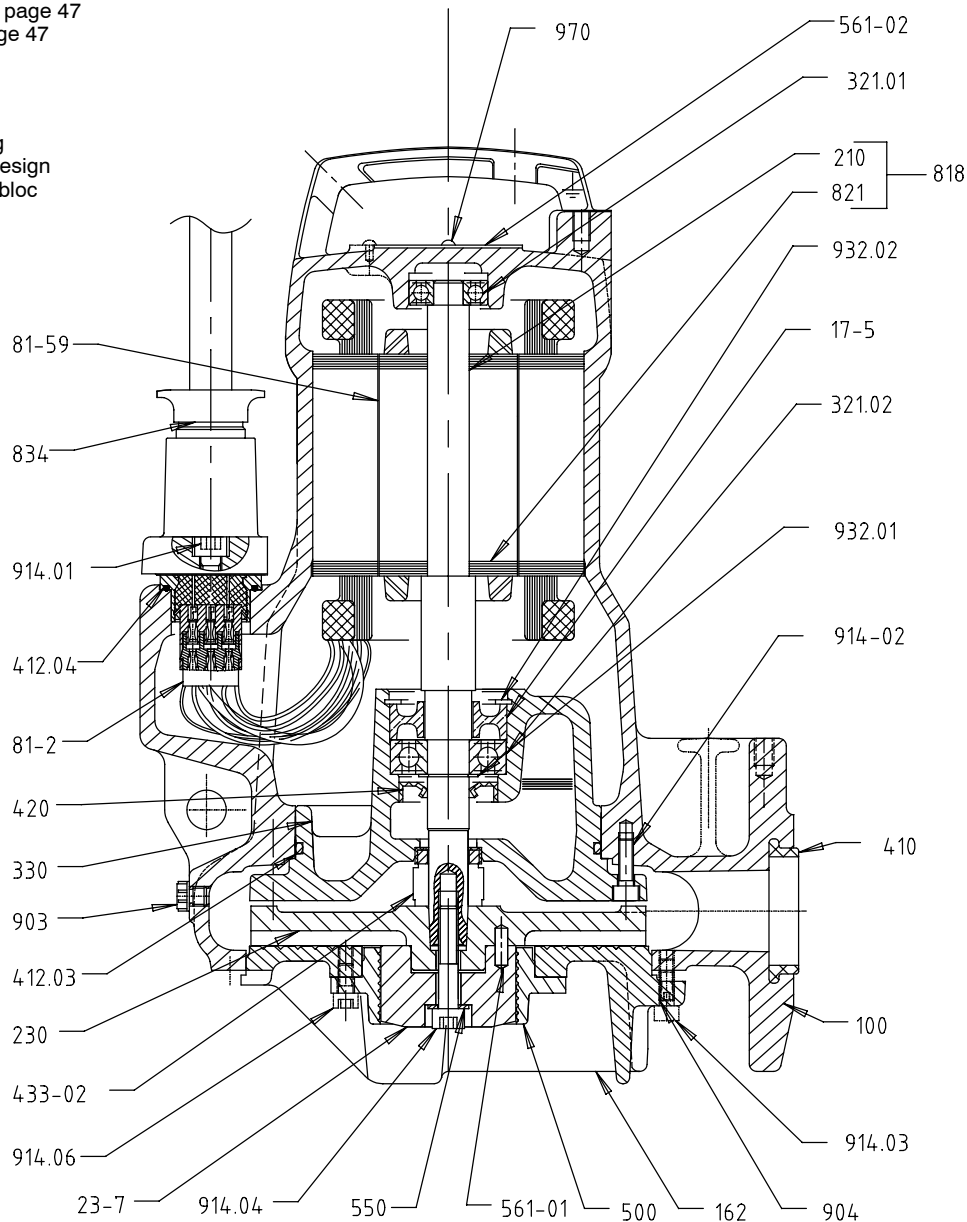
Gesamtzeichnung  
General assembly drawing  
Plan d'ensemble  
Disegno di insieme  
Plano de conjunto  
Doorsnedetekening

YLG

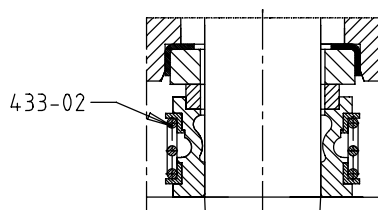
S 32-160

Teile-Benennung siehe Seite 47  
Designation see page 47  
Repères voir page 47

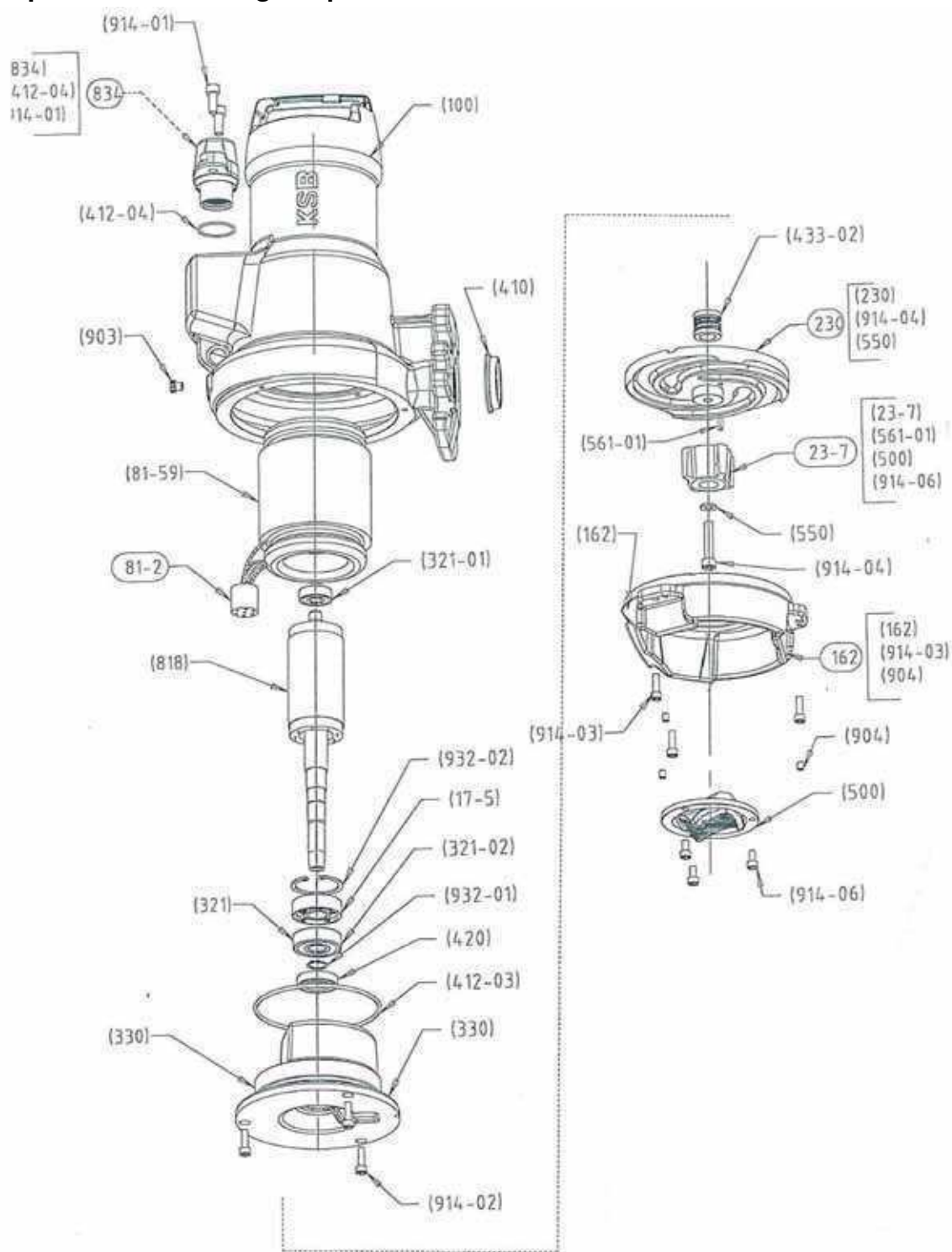
Blockausführung  
Close-coupled design  
Exécution monobloc  
G



GLRD-Standardausführung  
mechanical seal - standard design  
garniture mécanique standard



Explosionszeichnung / Exploded view / Vue éclatée



Teile-Benennung siehe Seite 47  
Designation see page 47  
Repères voir page 47

433	59-17	Schäkel / Shackle / Manille
420	69-6	Temperaturfühler / Temperature sensor / Sonde T°
321.01	99-15	Schmiermittel / Lubricant / Lubrifiant
321.02	99-18	Ersatzteile / Spare parts / Pièces de rechanges
932.01	182	Füße / Feet / Pied
410		
412.03		
412.04		
914.02		
914.03		
914.04		
914.05		
903		
904		
550		

Teile Nr. Part no. Repère	D	GB	F
	Teile-Benennung	Designation	Désignation
100	Gehäuse	Casing	Corps
162	Saugdeckel	Suction cover	Fond d'aspiration
17-5	Leitblech	Baffle	Chicane
23-7	Laufradkörper	Impeller body	Couteau
210	Welle	Shaft	Arbre
230	Laufrad	Impeller	Roue
321	Radialkugellager	Radial ball bearings	Roulement a billes
330	Lagerträger	Bearing bracket	Corps de palier double
355	Lagerträgergehäuse	Bearing bracket housing	Corps de palier simple
410	Profildichtung	Profile joint	Joint profilé
412	O-Ring	O-ring	Joint torique
420	Wellendichtring	Shaft seal ring	Bague d'étanchéité
433	Gleitringdichtung	Mechanical seal	Garniture mécanique
476	Gegenringträger	Seat ring holder	Siège grain fixe
500	Ring	Ring	Bague
550	Scheibe	Disc	Rondelle
561	Kerbnagel / Kerbstift	Grooved pin	Goupille cannelée
81-2	Stecker	Plug	Fiche mâle
81-59	Stator	Stator	Stator
818	Rotor	Rotor	Rotor
821	Rotorpaket	Rotor laminations	Tôlerie rotorique
834	Leitungsdurchführung	Cable gland	Passage de câble
903	Verschlußschraube	Screwed plug	Bouchon fileté
904	Gewindestift	Grub screw	Vis sans tête
914	Innensechskantschraube	Hex. socket head cap screw	Vis à 6 pans creux
932	Sicherungsring	Circlip	Segment d'arrêt

**Konformitätserklärung / EC declaration of conformity / Déclaration CE de conformité**

Hiermit erklären wir, dass das Pumpenaggregat  
*Herewith we declare that the pump unit*  
Par la présente, nous déclarons que le groupe moto-pompe

**Amarex® N S 32-160**

folgenden einschlägigen Bestimmungen in der jeweils gültigen Fassung entspricht:  
*complies with the following provisions as applicable to its appropriate current version:*  
correspond aux dispositions pertinentes suivantes dans la version respective en vigueur:

Richtlinie 98/37/EWG "Maschinen", Anhang II A,  
Richtlinie 89/336/EWG "Elektromagnetische Verträglichkeit", Anhang I,  
Richtlinie 73/23/EWG "Niederspannungsrichtlinie", Anhang III B  
und der Richtlinie 94/9/CE (ATEX 100a)


*EC machinery directive 98/37/EEC, Annex II A,  
EC electromagnetic compatibility directive 89/336/EEC, Annex I,  
EC directive on low-voltage equipment 73/23/EEC, Annex III B  
and the EC directive 94/9/CE (ATEX 100a)*

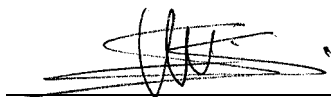
Directive relative aux machines 98/37/CE, Annexe II A,  
directive relative à la compatibilité électromagnétique 89/336/CEE, Annexe I,  
directive relative à la basse tension 73/23/CEE, Annexe III B  
et la directive 94/9/CE (ATEX 100a)

Angewendete harmonisierte Normen, insbesondere  
*Applied harmonized standards, in particular*  
Normes harmonisées utilisées, notamment

**EN 12 050 - 1 (2001 - 05), EN 809 (1998 - 11),  
EN 60 034 - 1 (1999 - 12), EN 60 034 - 5 (2001 - 09),  
EN 60 335 - 1 (2003 - 05), EN 60 335 - 2 - 41 (1996 - 09),  
EN 61 000 - 6 - 1 (2002 - 01), EN 61 000 - 6 - 2 (2002 - 02),  
EN 61 000 - 6 - 3 (2002 - 01), EN 61 000 - 6 - 4 (2002 - 01)**

**Ausführung YL: LCIE 08 ATEX 6016 X EN 60 079-0 (2006) + (60 079-1 (2004)  
YL model: LCIE 08 ATEX 6016 X EN 60 079-0 (2006) + (60 079-1 (2004)  
Version YL : LCIE 08 ATEX 6016 X EN 60 079-0 (2006) + (60 079-1 (2004))**

**CE 0081  II2G-Ex d IIB T4 - LCIE 03 ATEX Q 8047 - EN 13980 (Annex IV)**



Martial Smis 15.09.2007  
Responsable Recherche et Développement Pompes de petite Puissance  
KSB S.A.S., 128, rue Carnot, 59320 Sequedin/Lille (France)

Technische Änderungen bleiben vorbehalten.