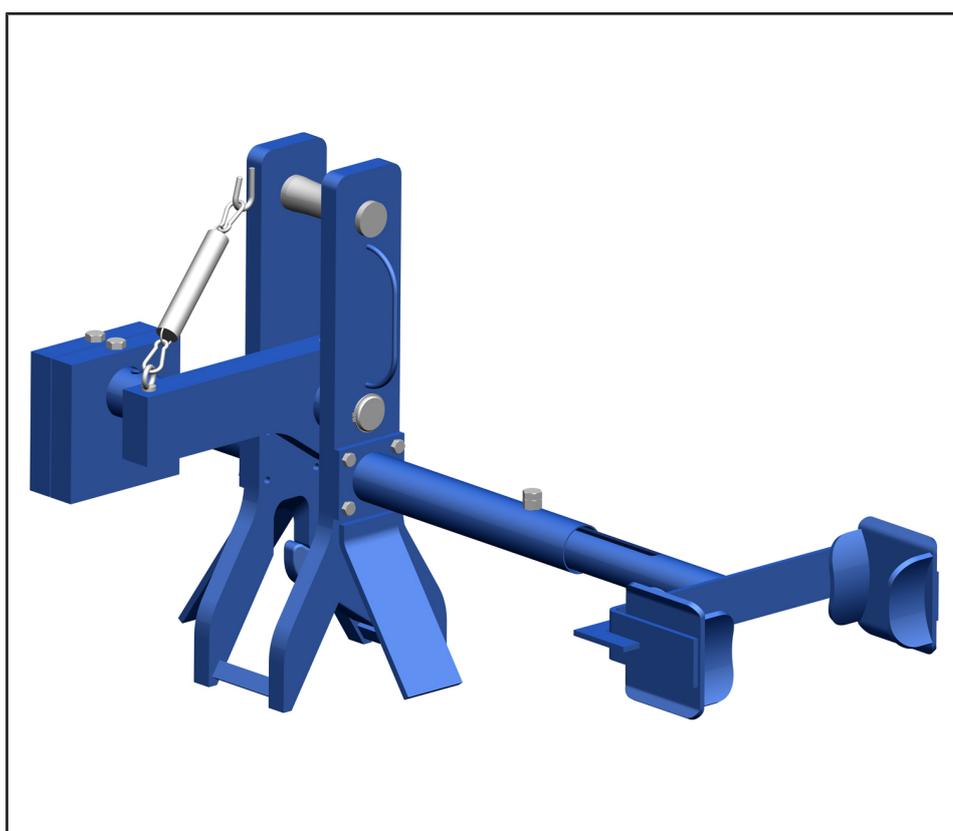


Lifting Accessory

# Deep Lift System

## Installation/Operating Manual



Mat. No.: 01512337

## **Legal information/Copyright**

Installation/Operating Manual Deep Lift System

Original operating manual

All rights reserved. The contents provided herein must neither be distributed, copied, reproduced, edited or processed for any other purpose, nor otherwise transmitted, published or made available to a third party without the manufacturer's express written consent.

Subject to technical modification without prior notice.

© KSB SE & Co. KGaA, Frankenthal 01/07/2020

## Contents

|          |  |           |
|----------|--|-----------|
| <b>1</b> | <b>General.....</b>  | <b>5</b>  |
| 1.1      | Principles.....  | 5         |
| 1.2      | Target group.....  | 5         |
| 1.3      | Other applicable documents.....  | 5         |
| 1.4      | Symbols.....   | 5         |
| 1.5      | Key to safety symbols/markings.....  | 5         |
| <b>2</b> | <b>Safety.....</b>   | <b>7</b>  |
| 2.1      | General.....   | 7         |
| 2.2      | Intended use.....  | 7         |
| 2.3      | Personnel qualification and personnel training.....                                    | 7         |
| 2.4      | Consequences and risks caused by non-compliance with these operating instructions..... | 7         |
| 2.5      | Safety awareness.....  | 8         |
| 2.6      | Safety information for the user/operator.....  | 8         |
| 2.7      | Safety information for maintenance, inspection and installation.....                   | 8         |
| 2.8      | Unauthorised modes of operation.....   | 8         |
| <b>3</b> | <b>Transport/Storage/Disposal.....</b>   | <b>9</b>  |
| 3.1      | Checking the condition upon delivery.....  | 9         |
| 3.2      | Transport.....   | 9         |
| 3.2.1    | Placing down the lifting accessory.....  | 9         |
| 3.3      | Storage/preservation.....  | 9         |
| 3.4      | Return to supplier.....  | 10        |
| 3.5      | Disposal.....  | 11        |
| <b>4</b> | <b>Description.....</b>  | <b>12</b> |
| 4.1      | General description.....   | 12        |
| 4.2      | Designation.....   | 12        |
| 4.3      | Product information.....   | 12        |
| 4.3.1    | Product information as per Regulation No. 1907/2006 (REACH).....                       | 12        |
| 4.4      | Name plate.....  | 12        |
| 4.5      | Configuration and function.....  | 13        |
| 4.6      | Dimensions and weights.....  | 13        |
| 4.7      | Operating limits.....  | 14        |
| 4.8      | Tightening torques.....  | 14        |
| 4.9      | Materials.....   | 14        |
| <b>5</b> | <b>Operation.....</b>  | <b>15</b> |
| 5.1      | Safety regulations.....  | 15        |
| 5.2      | Lowering the pump set.....   | 15        |
| 5.3      | Pulling out the pump set.....  | 19        |
| <b>6</b> | <b>Servicing/Maintenance.....</b>  | <b>23</b> |
| 6.1      | Safety regulations.....  | 23        |
| 6.2      | Maintenance/inspection.....  | 23        |
| 6.3      | Cleaning.....  | 24        |
| 6.4      | Spare parts stock.....   | 24        |
| 6.4.1    | Ordering spare parts.....  | 24        |
| <b>7</b> | <b>Trouble-shooting.....</b>   | <b>25</b> |
| <b>8</b> | <b>Related Documents.....</b>  | <b>26</b> |
| 8.1      | General assembly drawing with list of components.....                                  | 26        |
| 8.2      | Dimensions.....  | 27        |
| 8.2.1    | Bail for Deep Lift System.....   | 27        |
| 8.2.2    | Deep Lift System DLS-4.....  | 28        |
| 8.2.3    | Deep Lift System DLS-15.....   | 28        |

|    |                                     |    |
|----|-------------------------------------|----|
| 9  | EU Declaration of Conformity .....  | 29 |
| 10 | Certificate of Decontamination..... | 30 |
|    | Index .....                         | 31 |

## 1 General

### 1.1 Principles

This operating manual is valid for the type series and variants indicated on the front cover.

The operating manual describes the proper and safe use of this equipment in all phases of operation.

The name plate indicates the type series and size, the main operating data, the order number and the order item number. The order number and order item number clearly identify the pump set and serve as identification for all further business processes.

In the event of damage, immediately contact your nearest KSB service facility to maintain the right to claim under warranty.

### 1.2 Target group

This operating manual is aimed at the target group of trained and qualified specialist technical personnel.

### 1.3 Other applicable documents

**Table 1:** Overview of other applicable documents

| Document                               | Contents          |
|--|-------------------|
| General assembly drawing <sup>1)</sup> | Sectional drawing |

### 1.4 Symbols

**Table 2:** Symbols used in this manual

| Symbol  | Description  |
|---|--|
| ✓   | Conditions which need to be fulfilled before proceeding with the step-by-step instructions |
| ▷   | Safety instructions  |
| ⇒   | Result of an action  |
| ⇔   | Cross-references   |
| 1.<br>2.  | Step-by-step instructions  |
|  | Note<br>Recommendations and important information on how to handle the product             |

### 1.5 Key to safety symbols/markings

**Table 3:** Definition of safety symbols/markings

| Symbol   | Description   |
|--|---|
|  <b>DANGER</b>  | <b>DANGER</b><br>This signal word indicates a high-risk hazard which, if not avoided, will result in death or serious injury.         |
|  <b>WARNING</b> | <b>WARNING</b><br>This signal word indicates a medium-risk hazard which, if not avoided, could result in death or serious injury.     |
|  <b>CAUTION</b> | <b>CAUTION</b><br>This signal word indicates a hazard which, if not avoided, could result in damage to the machine and its functions. |

1) If agreed to be included in the scope of supply

| Symbol  | Description   |
|---|---|
|  | <p><b>General hazard</b><br/>In conjunction with one of the signal words this symbol indicates a hazard which will or could result in death or serious injury.</p>  |
|  | <p><b>Electrical hazard</b><br/>In conjunction with one of the signal words this symbol indicates a hazard involving electrical voltage and identifies information about protection against electrical voltage.</p> |
|  | <p><b>Machine damage</b><br/>In conjunction with the signal word CAUTION this symbol indicates a hazard for the machine and its functions.</p>  |



## 2 Safety

All the information contained in this section refers to hazardous situations.

In addition to the present general safety information the action-related safety information given in the other sections must be observed.

### 2.1 General

- This operating manual contains general installation, operating and maintenance instructions that must be observed to ensure safe operation of the system and prevent personal injury and damage to property.
- Comply with all the safety instructions given in the individual sections of this operating manual.
- The operating manual must be read and understood by the responsible specialist personnel/operators prior to installation and commissioning.
- The contents of this operating manual must be available to the specialist personnel at the site at all times.
- The operator is responsible for ensuring compliance with all local regulations not taken into account.

### 2.2 Intended use

- The lifting accessories must only be used within the limits described in this installation/operating manual.
- Only use lifting accessories which are in perfect technical condition.
- Only use the lifting accessories in the fluid described in the data sheet or product literature.
- Consult the manufacturer about any other modes of use not described in the data sheet or product literature.
- Never exceed the permissible application and operating limits specified in the data sheet or product literature regarding temperature, etc.
- Observe all safety information and instructions in this manual.

### 2.3 Personnel qualification and personnel training

All personnel involved must be fully qualified to transport, operate, maintain and inspect the equipment this manual refers to. The responsibilities, competence and supervision of all personnel involved in operation, maintenance and inspection must be clearly defined by the operator.

Deficits in knowledge must be rectified by means of training and instruction provided by sufficiently trained specialist personnel. If required, the operator can commission the manufacturer/supplier to train the personnel.

Training on the product must always be supervised by specialist technical personnel.

### 2.4 Consequences and risks caused by non-compliance with these operating instructions

- Non-compliance with these operating instructions will lead to forfeiture of warranty cover and of any and all rights to claims for damages.
- Non-compliance can, for example, have the following consequences:
  - Risk of load or lifting accessory components falling down
  - Risk of lifting accessories tipping over if positioned on inclined surfaces and/or if not in a sufficiently stable position
  - Risk of crushing and shearing injuries by moving parts or by parts under tension
  - Risk to health and environment from hazardous fluids or substances
  - Failure of important product functions

### 2.5 Safety awareness

In addition to the safety information contained in this operating manual and the intended use, the following safety regulations shall be complied with:

- Accident prevention, health regulations and safety regulations
- Explosion protection regulations
- Safety regulations for handling hazardous substances
- Applicable standards, directives and laws

### 2.6 Safety information for the user/operator

- Provide the personnel with protective equipment and make sure it is used.
- Contain any residues of hazardous fluids (e.g. explosive, toxic, hot) so as to avoid any danger to persons and the environment. Observe all legal requirements.

### 2.7 Safety information for maintenance, inspection and installation

- Modifications or alterations of the product are only permitted with the manufacturer's prior consent.
- Use only original spare parts or parts/components authorised by the manufacturer. The use of other parts/components can invalidate any liability of the manufacturer for resulting damage.
- The operator ensures that maintenance, inspection and installation are performed by authorised, qualified specialist personnel who are thoroughly familiar with the manual.
- Carry out all work at the product in the designated work area.
- The product must have cooled down to ambient temperature.
- Decontaminate products which have been used in fluids posing a health hazard.

### 2.8 Unauthorised modes of operation

Never operate the product outside the limits stated in the data sheet and in this manual.

The warranty relating to the operating reliability and safety of the product supplied is only valid if the product is used in accordance with its intended use.

### 3 Transport/Storage/Disposal

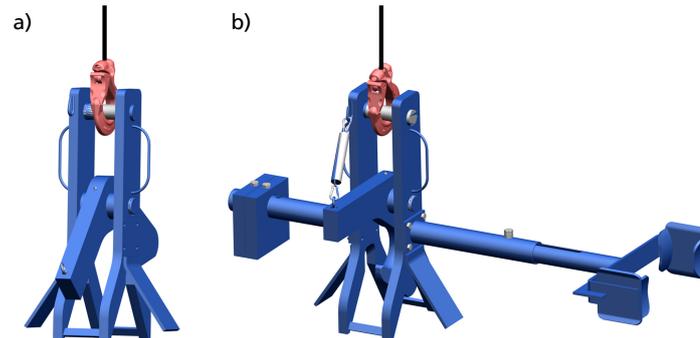
#### 3.1 Checking the condition upon delivery

1. On transfer of goods, check each packaging unit for damage.
2. In the event of in-transit damage, assess the exact damage, document it and notify KSB or the supplying dealer and the insurer about the damage in writing immediately.

#### 3.2 Transport

|  |   |
|--|---|
|  | <b>⚠ DANGER</b>   |
|  | <p><b>Improper transport</b><br/>           Danger to life from falling parts!<br/>           Damage to the pump set!</p> <ul style="list-style-type: none"> <li>▷ Use tested, marked and approved lifting accessories only.</li> <li>▷ The load-carrying capacity of the lifting accessory must be greater than the weight indicated on the name plate of the product to be lifted.</li> <li>▷ Use the attachment point provided for attaching the lifting accessory.</li> <li>▷ Never suspend the pump set by its power cable.</li> <li>▷ Never enter the area underneath suspended load.</li> <li>▷ Observe the regional transport regulations.</li> </ul> |

Transport the lifting accessory as illustrated.



**Fig. 1:** Transporting the lifting accessory a) for lowering the pump set; b) for pulling out the pump set

##### 3.2.1 Placing down the lifting accessory

|  |   |
|--|---|
|  | <b>⚠ WARNING</b>  |
|  | <p><b>Placing the lifting accessory on unsecured and uneven surfaces</b><br/>           Personal injury and damage to property!</p> <ul style="list-style-type: none"> <li>▷ Only place the lifting accessory on a solid and level surface.</li> <li>▷ Only place the lifting accessory on a surface of sufficient load-carrying capacity.</li> <li>▷ Use appropriate means to secure the lifting accessory against tilting or tipping over.</li> </ul> |

#### 3.3 Storage/preservation

**Storage** If the ambient conditions for storage are met, the function of the lifting accessory is safeguarded even after a prolonged period of storage.

**Table 4:** Ambient conditions for storage

| Ambient condition   | Value                      |                  |
|---------------------|----------------------------|------------------|
| Relative humidity   | Max. 85 % (non-condensing) |                  |
| Ambient temperature | -20 °C to +80 °C           | -4 °F to +176 °F |

- Store the lifting accessory in dry, vibration-free conditions, and protect it against the weather as far as possible.
- Store the lifting accessory in a dry room where the atmospheric humidity is as constant as possible.
- Prevent excessive fluctuations in atmospheric humidity (see table Ambient conditions for storage).

If stored properly, the product will be protected for a maximum of 12 months.

**Preservation** Preservation will protect the lifting accessory against corrosion if it is stored or shut down for a prolonged period of time.

|  |  |
|--|--|
|  | <p><b>! WARNING</b></p>  |
|  | <p><b>Fluids, consumables and supplies posing a health hazard</b><br/>Hazard to persons and the environment!</p> <ul style="list-style-type: none"> <li>▷ Collect and dispose of any preservatives, flushing liquids and fluid residues.</li> <li>▷ Wear safety clothing and a protective mask, if required.</li> <li>▷ Observe all legal regulations on the disposal of fluids posing a health hazard.</li> </ul> |
|  | <p><b>NOTE</b></p>   |
|  | <p>Observe the manufacturer's instructions for application/removal of the preservative.</p>  |

1. Thoroughly clean the lifting accessory.
2. Evenly apply the preservative.

**Removing the preservative** Preservatives must be removed from the lifting accessory prior to commissioning.

|  |  |
|--|--|
|  | <p><b>! WARNING</b></p>  |
|  | <p><b>Fluids, consumables and supplies posing a health hazard</b><br/>Hazard to persons and the environment!</p> <ul style="list-style-type: none"> <li>▷ Collect and dispose of any preservatives, flushing liquids and fluid residues.</li> <li>▷ Wear safety clothing and a protective mask, if required.</li> <li>▷ Observe all legal regulations on the disposal of fluids posing a health hazard.</li> </ul> |
|  | <p><b>NOTE</b></p>   |
|  | <p>Observe the manufacturer's instructions for application/removal of the preservative.</p>  |

**3.4 Return to supplier**

1. Prior to returning the product to the supplier, flush and clean it, particularly if it has been used in noxious, explosive, hot or other hazardous fluids.
2. If the product has been used in fluids whose residues could lead to corrosion damage in the presence of atmospheric humidity or could ignite upon contact with oxygen, the product must also be neutralised and treated with anhydrous inert gas to ensure drying.
3. Always complete and enclose a certificate of decontamination when returning the product. (⇒ Section 10, Page 30)  
Indicate any safety measures and decontamination measures taken.

2553.89/05-EN

|   |  |
|---|--|
|  | <b>NOTE</b>  |
|   | <p>If required, a blank certificate of decontamination can be downloaded from the following web site: <a href="http://www.ksb.com/certificate_of_decontamination">www.ksb.com/certificate_of_decontamination</a></p> |

### 3.5 Disposal

|   |  |
|---|--|
|  |  <b>WARNING</b>   |
|   | <p><b>Fluids, consumables and supplies posing a health hazard</b><br/>Hazard to persons and the environment!</p> <ul style="list-style-type: none"> <li>▷ Collect and dispose of any preservatives, flushing liquids and fluid residues.</li> <li>▷ Wear safety clothing and a protective mask, if required.</li> <li>▷ Observe all legal regulations on the disposal of fluids posing a health hazard.</li> </ul> |

1. Dismantle the product.  
Collect greases and other lubricants during dismantling.
2. Separate and sort the materials, e.g. by:
  - Metals
  - Plastics
  - Electronic waste
  - Greases and other lubricants
3. Dispose of materials in accordance with local regulations or in another controlled manner.

## 4 Description

### 4.1 General description

- Lifting accessory
- To DIN EN 13155

Lifting accessories serve to lower submersible pumps made by KSB into deep, filled pump sumps, and to pull them out again.  
No chains, support ropes or guide ropes need to be permanently attached to the pump set.

### 4.2 Designation

**Example: Deep Lift System DLS - 15**

**Table 5: Designation key**

| Code             | Description                                  |
|------------------|--|
| Deep Lift System | Type series                                  |
| DSL - 15         | Size, permissible load-carrying capacity [t] |
|                  | 4, 15  |

### 4.3 Product information

#### 4.3.1 Product information as per Regulation No. 1907/2006 (REACH)

For information as per chemicals Regulation (EC) No. 1907/2006 (REACH), see <http://www.ksb.com/reach>.

### 4.4 Name plate



**Fig. 2: Name plate (example)**

|   |                               |   |                         |
|---|-------------------------------|---|-------------------------|
| 1 | Designation                   | 2 | KSB order number        |
| 3 | Size (⇒ Section 4.2, Page 12) | 4 | Corresponding pump size |
| 5 | Load-carrying capacity        | 6 | Weight                  |
| 7 | Year of construction          |   |                         |

### 4.5 Configuration and function

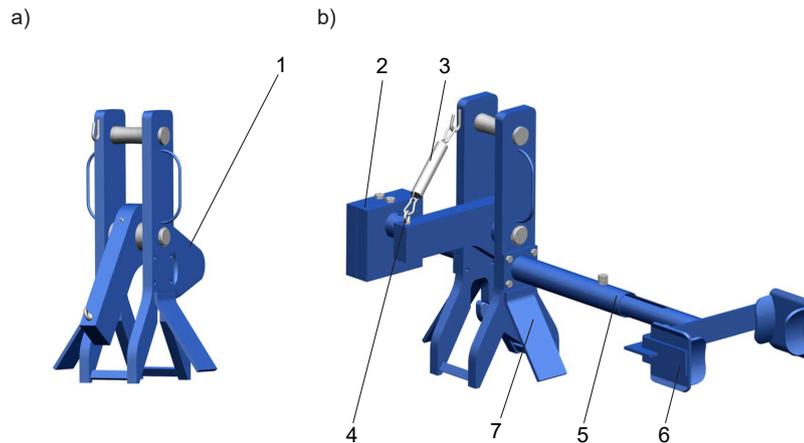


Fig. 3: Lifting accessory a) Lowering the pump set b) Pulling out the pump set

|   |                 |   |             |
|---|-----------------|---|-------------|
| 1 | Hook            | 2 | Weights     |
| 3 | Spring          | 4 | Eyebolt     |
| 5 | Connection pipe | 6 | Guide piece |
| 7 | Guide plate     |   |             |

**Design** The deep lift system is a lifting accessory for lowering submersible pumps into a pump sump and pulling them out again without the need for a permanently attached lifting chain.

**Function** For lowering the pump set into the pump sump the connection pipe (5), weights (2), guide piece (6) and spring (3) must not be fitted. The pump set is suspended from the deep lift system. The hook (1) engages into the pump bail. The pump set is lowered into the pump sump by means of the lifting accessory. The hook (1) remains closed during this process due to the weight of the pump set. When the pump set reaches its position in the pump sump, the pump weight no longer acts on the hook. The hook disengages. The deep lift system can now be pulled out of the pump sump.

For pulling the pump set out of the pump sump the connection pipe (5), weights (2), guide piece (6) and spring (3) must be fitted. The spring (3) is hooked to the eyebolt (4) of the Deep Lift System. This will keep hook (1) closed. The deep lift system is lowered into the pump sump with its guide piece (6) sliding along the guide rails. The guide piece (6) is mounted on the guide rails of the pump sump to be lowered down into the pump sump. The hook (1) is designed especially to slide onto the pump bail and engage in it. This allows the pump set to be pulled out of the pump sump.

### 4.6 Dimensions and weights

For dimensions and weights please refer to the general arrangement drawing/outline drawing or data sheet.

### 4.7 Operating limits

Observe the following parameters and values during operation:

| Parameter         | Value   |
|-------------------|---|
| Limits of use     | <ul style="list-style-type: none"> <li>Submersible pumps made by KSB</li> <li>Permissible load-carrying capacity (⇒ Section 4.2, Page 12) (⇒ Section 8.2.1, Page 27)</li> </ul>   |
| Space limits      | <ul style="list-style-type: none"> <li>Maximum bail dimensions of the submersible pump (⇒ Section 8.2.1, Page 27)</li> <li>Specific design and dimensions for submersible pumps made by KSB</li> <li>Maximum dimensions of the pump sump</li> </ul>                       |
| Time limits       | <ul style="list-style-type: none"> <li>Maximum 20,000 load cycles and/or 20 years from commissioning of the component<sup>2)</sup></li> <li>Scheduled checks/inspection of the lifting accessory, especially the load-carrying components (hook, spring, etc.)</li> </ul> |
| Applications      | <ul style="list-style-type: none"> <li>Pump installations</li> <li>Industrial plants</li> <li>Chemical plants</li> <li>Waste water treatment plants</li> </ul>  |
| Fluids handled    | <ul style="list-style-type: none"> <li>Fluids for which the submersible pumps have been approved</li> <li>Fluids which are neither chemically nor mechanically aggressive to the pump and component materials</li> </ul>  |
| Temperature range | <ul style="list-style-type: none"> <li>-20 °C to +80 °C</li> <li>-4 °F to +176 °F</li> </ul>  |

### 4.8 Tightening torques

Table 6: Tightening torques

| Thread | Quality | [Nm] | [ft lbs] |
|--------|---------|------|----------|
| M8     | 8.8     | 35   | 18       |
| M10    | 8.8     | 63   | 32       |

### 4.9 Materials

Table 7: Overview of materials used

| Component                              | Material  |
|--|---|
| Support frame                          | Unalloyed quality steel (S355J2) [1.0570]   |
| Load-carrying rod of the Support frame | Stainless austenitic-ferritic chrome nickel molybdenum steel (X2CrNiMo 22-5-3) [1.4462] |
| Hook                                   | High-strength fine grain structural steel (S550Q) [1.8904]                              |
| Pin                                    | Stainless austenitic-ferritic chrome nickel molybdenum steel (X2CrNiMo 22-5-3) [1.4462] |

2) A minimum of 2 load cycles is required each time the pump is lowered or pulled up.

## 5 Operation

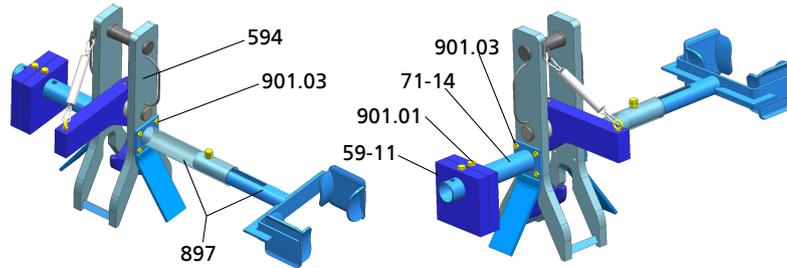
### 5.1 Safety regulations

|   |  |
|---|--|
|    | <p><b>⚠ DANGER</b></p> <p><b>Persons in the sump</b><br/>         Danger to life from falling parts!</p> <ul style="list-style-type: none"> <li>▷ Make sure that nobody is in the sump while the pump is being lowered or pulled out.</li> </ul>   |
|    | <p><b>⚠ DANGER</b></p> <p><b>Improper transport</b><br/>         Danger to life from falling parts!<br/>         Damage to the pump set!</p> <ul style="list-style-type: none"> <li>▷ Use tested, marked and approved lifting accessories only.</li> <li>▷ The load-carrying capacity of the lifting accessory must be greater than the weight indicated on the name plate of the product to be lifted.</li> <li>▷ Use the attachment point provided for attaching the lifting accessory.</li> <li>▷ Never suspend the pump set by its power cable.</li> <li>▷ Never enter the area underneath suspended load.</li> <li>▷ Observe the regional transport regulations.</li> </ul> |
|  | <p><b>⚠ WARNING</b></p> <p><b>Improper handling when placing the pump set in a vertical/horizontal position</b><br/>         Personal injury and damage to property!</p> <ul style="list-style-type: none"> <li>▷ Use appropriate means to secure the pump set against overturning or tipping over.</li> <li>▷ Secure power cables against falling.</li> <li>▷ Use additional supports for the transport holder to secure the pump set against overturning.</li> <li>▷ Maintain adequate safety distance during lifting operations.</li> </ul>   |
|  | <p><b>⚠ WARNING</b></p> <p><b>Improper lifting/moving of heavy assemblies or components</b><br/>         Personal injury and damage to property!</p> <ul style="list-style-type: none"> <li>▷ Use suitable transport devices, lifting equipment and lifting tackle to move heavy assemblies or components.</li> </ul>  |

### 5.2 Lowering the pump set

#### Removing the connection pipe, weights and guide piece

|   |  |
|---|--|
|  | <p><b>⚠ DANGER</b></p> <p><b>Falling parts</b><br/>         Injury from falling parts!</p> <ul style="list-style-type: none"> <li>▷ Use appropriate means to secure the parts, if possible.</li> <li>▷ Wear personal protective equipment.</li> <li>▷ Observe the applicable local accident prevention regulations.</li> </ul> |
|---|--|

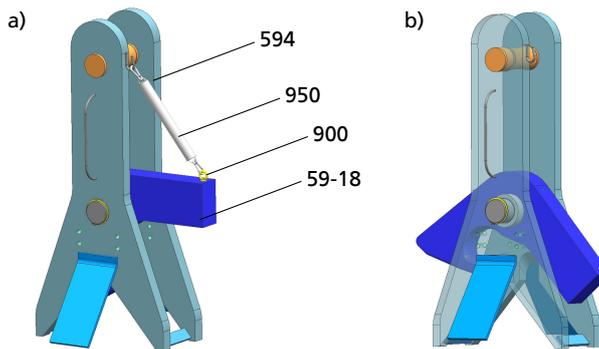


**Fig. 4:** Removing the connection pipe, weights and guide piece

1. Undo fastening screws 901.03. Remove guide piece 897 from support frame 594.
2. Undo fastening screws 901.01. Pull weights 59-11 off connection pipe 71-14.
3. Undo fastening screws 901.03. Remove connection pipe 71-14.

**Removing the spring**

|  |  |
|--|--|
|  | <p><b>⚠ WARNING</b></p>  |
|  | <p><b>Risk of injury from spring under tension and moving parts</b><br/>                 Risk of shearing and crushing injuries!</p> <ul style="list-style-type: none"> <li>▷ Prior to removing spring 950, secure hook 59-18 in closed position with a suitable tool (e.g. rod/manipulator).</li> </ul> |



**Fig. 5:** Removing the spring a) closed position b) open position

- ✓ Hook 59-18 with fitted spring 950 is in closed position.
1. Undo the carabine hooks of spring 950 at support frame 594 and at eyebolt 900 of hook 59-18.
    - ⇒ This will cause hook 59-18 to swivel down into open position.

**Lowering the pump set**

|  |   |
|--|---|
|  | <p><b>⚠ DANGER</b></p>  |
|  | <p><b>Persons in the sump</b><br/>                 Danger to life from falling parts!</p> <ul style="list-style-type: none"> <li>▷ Make sure that nobody is in the sump while the pump is being lowered or pulled out.</li> </ul> |

|  |   |
|--|---|
|  | <p><b>⚠ WARNING</b></p>   |
|  | <p><b>Unintentional start-up</b><br/>                 Risk of injury by moving parts!</p> <ul style="list-style-type: none"> <li>▷ Always make sure the electrical connections (including control cable) are disconnected before carrying out work on the pump set.</li> <li>▷ Secure the pump set against unintentional start-up.</li> </ul> |

2553.89/05-EN

|   |   |
|---|---|
|  | <p><b>! DANGER</b></p>  |
|   | <p><b>The pump (set) could slip out of the suspension arrangement</b><br/>                 Danger to life from falling parts!</p> <ul style="list-style-type: none"> <li>▷ Observe the information on weights, centre of gravity and fastening points.</li> <li>▷ Observe the applicable local accident prevention regulations.</li> <li>▷ Use suitable, approved lifting accessories.</li> </ul> |

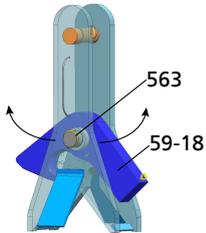
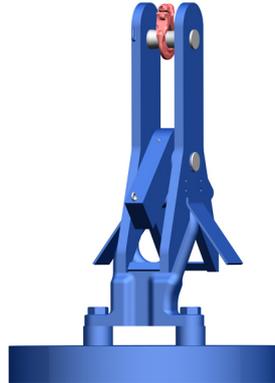


Fig. 6: Prerequisites

- ✓ Spring, connection pipe, weights and guide piece have been removed.
  - ✓ Hook 59-18 can easily be swivelled on pin 563.
1. If required, grease hook 59-18 so it can easily be swivelled on pin 563.
  2. Attach the crane hook to the lifting accessory.



3. Use a crane to lift the lifting accessory onto the pump bail.



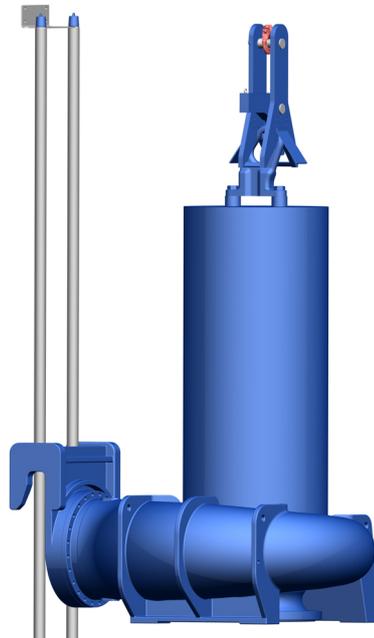
|   |  |
|---|--|
|  | <p><b>! WARNING</b></p>  |
|   | <p><b>Swivel movement of the hook at the lifting accessory</b><br/>                 Crushing of hands at the lifting accessory when engaging the hook into the bail!</p> <ul style="list-style-type: none"> <li>▷ Never touch the lifting accessory when engaging the hook into the bail.</li> </ul> |

4. Use a suitable tool (e.g. rope, rod) to engage hook 59-18 into the pump bail and secure it in closed position.
5. Slightly lift the lifting accessory and remove the tool.
  - ⇒ The pump set is securely held in the lifting accessory by its own weight.
6. Use a crane to lift the lifting accessory from which the pump set is suspended. Position the lifting accessory above the pump sump.

|  |  |
|--|--|
|  | <p><b>⚠ DANGER</b></p>   |
|  | <p><b>Unsecured sump opening</b><br/>           Danger of death from falling!</p> <ul style="list-style-type: none"> <li>▷ Secure the danger zone.</li> <li>▷ Use approved protection equipment to prevent falling.</li> <li>▷ Never use the pump or parts of it to step on.</li> <li>▷ Observe the applicable local occupational safety regulations and accident prevention regulations.</li> </ul> |

|  |   |
|--|---|
|  | <p><b>⚠ WARNING</b></p>   |
|  | <p><b>Swivel movement of the pump set and lifting accessory</b><br/>           Risk of crushing hands when threading the pump set onto the guide rails!</p> <ul style="list-style-type: none"> <li>▷ Never touch the guide rails and lifting accessory when threading the pump set onto the guide rails.</li> </ul> |

7. Thread the claw fitted on the discharge nozzle of the pump set onto the guide rails.



|  |   |
|--|---|
|  | <p><b>NOTE</b></p>  |
|  | <p>Make sure the pump set with the pre-assembled claw can easily be guided over the mounting bracket, threaded onto the guide rails and lowered down. If required, alter the position of the crane during installation.</p> |

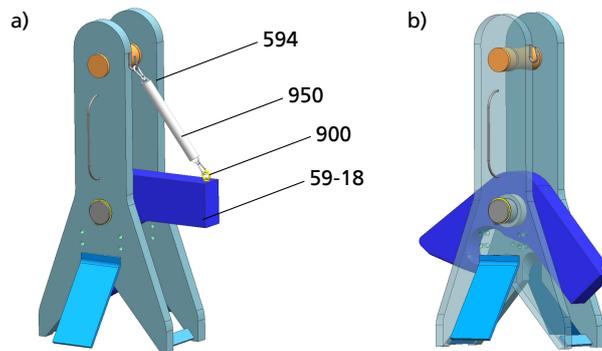
- 8. Lower the lifting accessory from which the pump set is suspended.
  - ⇒ The pump set is guided down into the sump with the claw at the discharge nozzle sliding along the guide rails.
  - ⇒ When the pump engages into the flanged bend and the weight is taken off hook 59-18, the hook automatically changes to open position and disengages from the pump bail.
- 9. Pull up the lifting accessory.
- 10. Place the lifting accessory down in a suitable place. Remove the crane hook.

2553.89/05-EN

### 5.3 Pulling out the pump set

#### Attaching the spring

|  |   |
|--|---|
|  | <p><b>! WARNING</b></p>   |
|  | <p><b>Risk of injury from spring under tension and moving parts</b><br/> <b>Risk of shearing and crushing injuries!</b></p> <ul style="list-style-type: none"> <li>▷ Prior to removing spring 950, secure hook 59-18 in closed position with a suitable tool (e.g. rod/manipulator).</li> </ul> |



**Fig. 7:** Fitting the spring a) closed position b) open position

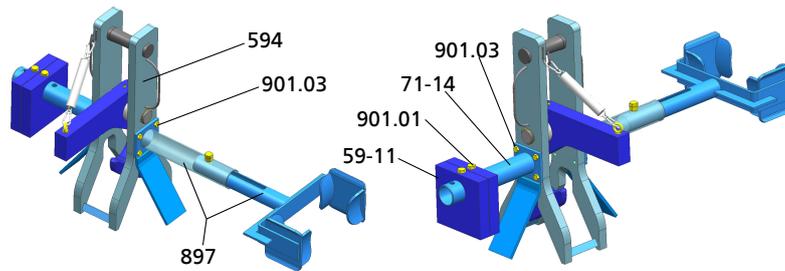
- ✓ Hook 59-18 without fitted spring 950 is in open position.
- 1. Use a suitable tool to secure hook 59-18 in closed position.
- 2. Attach the carabine hooks of spring 950 to support frame 594 and to eyebolt 900 of hook 59-18.
- 3. Remove the tools used.
- ⇒ Spring 950 secures hook 59-18 in closed position.

|  |   |
|--|---|
|  | <p><b>CAUTION</b></p>   |
|  | <p><b>Spring defective or contaminated</b><br/> <b>Risk of adverse affect on the function of the lifting accessory!</b></p> <ul style="list-style-type: none"> <li>▷ Clean spring 950 to remove any contamination.</li> <li>▷ Check that spring 950 secures hook 59-18 in closed position.</li> <li>▷ If the spring has been overstretched, replace it by a new one.</li> </ul> |

#### Fitting the connection pipe, weights and guide piece

|  |   |
|--|---|
|  | <p><b>! DANGER</b></p>  |
|  | <p><b>Falling parts</b><br/> <b>Injury from falling parts!</b></p> <ul style="list-style-type: none"> <li>▷ Check that the fastening screws/bolts are tightened and lock them with suitable means.</li> <li>▷ Check that the connection pipe, weights and guide piece are fitted properly and seated firmly.</li> <li>▷ Wear personal protective equipment.</li> <li>▷ Observe the applicable local accident prevention regulations.</li> </ul> |

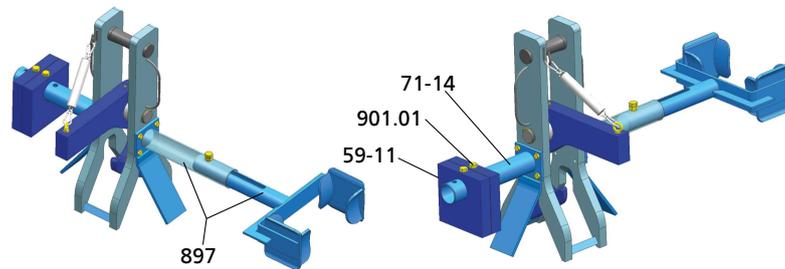
2553.89/05-EN



**Fig. 8:** Fitting the connection pipe, weights and guide piece

1. Fasten connection pipe 71-14 to support frame 594 with fastening screws 901.03. (⇒ Section 4.8, Page 14)
2. Slide weights 59-11 onto connection pipe 71-14. Secure them with fastening screws 901.01.
3. Fasten guide piece 897 to support frame 594 with fastening screws 901.03. (⇒ Section 4.8, Page 14)

**Adjusting the connection pipe, weights and guide piece**



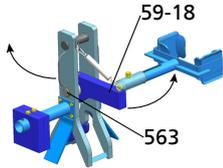
**Fig. 9:** Adjusting the connection pipe, weights and guide piece

1. Extend guide piece 897 to its maximum length.
2. Attach the crane hook to the lifting accessory.
3. Slightly lift the lifting accessory with a crane.
  - ⇒ The lifting accessory should be suspended from the crane in a horizontal position.
  - If required, adjust its position by moving the weights as follows.
4. Place the lifting accessory down in a suitable place.
5. Undo fastening screws 901.01. Move weights 59-11 along connection pipe 71-14 as required.
6. Tighten fastening screws 901.01 to secure weights 59-11. (⇒ Section 4.8, Page 14)
7. Slightly lift the lifting accessory with a crane to re-check the position of the lifting accessory. If required, keep adjusting the position.

**Pulling out the pump set**

|  |   |
|--|---|
|  | <b>DANGER</b>   |
|  | <p><b>Persons in the sump</b><br/>                 Danger to life from falling parts!</p> <ul style="list-style-type: none"> <li>▷ Make sure that nobody is in the sump while the pump is being lowered or pulled out.</li> </ul> |

|  |   |
|--|---|
|  | <b>⚠ DANGER</b>   |
|  | <p><b>The pump (set) could slip out of the suspension arrangement</b><br/>           Danger to life from falling parts!</p> <ul style="list-style-type: none"> <li>▷ Observe the information on weights, centre of gravity and fastening points.</li> <li>▷ Observe the applicable local accident prevention regulations.</li> <li>▷ Use suitable, approved lifting accessories.</li> </ul> |



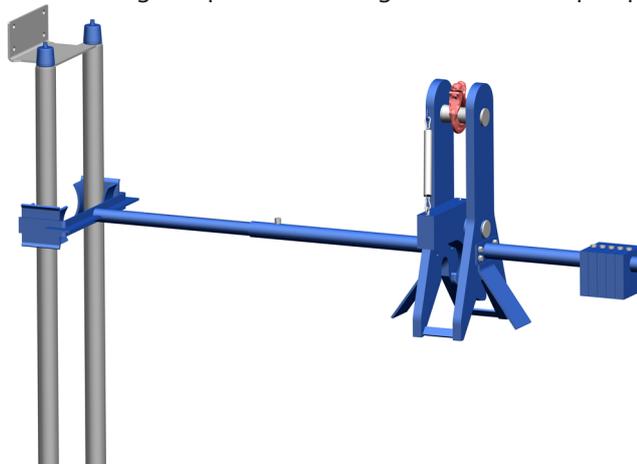
- ✓ Spring, connection pipe, weights and guide piece have been fitted.
  - ✓ Hook 59-18 can easily be swivelled on pin 563.
1. If required, grease hook 59-18 so it can easily be swivelled on pin 563.
  2. Use a crane to lift the lifting accessory and position it above the pump sump. Vertically align it with the edge of the tank.

Fig. 10: Prerequisites

|  |  |
|--|--|
|  | <b>⚠ DANGER</b>  |
|  | <p><b>Unsecured sump opening</b><br/>           Danger of death from falling!</p> <ul style="list-style-type: none"> <li>▷ Secure the danger zone.</li> <li>▷ Use approved protection equipment to prevent falling.</li> <li>▷ Never use the pump or parts of it to step on.</li> <li>▷ Observe the applicable local occupational safety regulations and accident prevention regulations.</li> </ul> |

|  |   |
|--|---|
|  | <b>⚠ WARNING</b>  |
|  | <p><b>Swivel movement of the pump set and lifting accessory</b><br/>           Risk of crushing hands when threading the pump set onto the guide rails!</p> <ul style="list-style-type: none"> <li>▷ Never touch the guide rails and lifting accessory when threading the pump set onto the guide rails.</li> </ul> |

3. Thread the guide piece onto the guide rails of the pump sump.



4. Lower the lifting accessory.
  - ⇒ The lifting accessory automatically engages in the pump set. Hook 59-18 slides onto the bail of the pump set. The spring automatically closes the hook.

5. Pull up the lifting accessory from which the pump set is suspended.



|  |  |
|--|--|
|  | <p><b>! WARNING</b></p>  |
|  | <p><b>Pump set and transport holder tipping over or rolling off</b><br/>         Risk of injury!</p> <ul style="list-style-type: none"> <li>▸ Secure the pump set and transport holder against tipping over or rolling off.</li> </ul> |

6. Place the pump (set) down in a suitable place.

|  |  |
|--|--|
|  | <p><b>! WARNING</b></p>  |
|  | <p><b>Swivel movement of the hook at the lifting accessory</b><br/>         Crushing of hands at the lifting accessory when disengaging the hook from the bail!</p> <ul style="list-style-type: none"> <li>▸ Never touch the lifting accessory when disengaging the hook from the bail.</li> </ul> |

7. Lower the lifting accessory until the hook can be opened manually.

8. Use a suitable tool to bring hook 59-18 into its open position. Remove the lifting accessory from the pump.

|  |   |
|--|---|
|  | <p><b>! WARNING</b></p>   |
|  | <p><b>Placing the lifting accessory on unsecured and uneven surfaces</b><br/>         Personal injury and damage to property!</p> <ul style="list-style-type: none"> <li>▸ Only place the lifting accessory on a solid and level surface.</li> <li>▸ Only place the lifting accessory on a surface of sufficient load-carrying capacity.</li> <li>▸ Use appropriate means to secure the lifting accessory against tilting or tipping over.</li> </ul> |

9. Place the lifting accessory down in a suitable place. Remove the crane hook.

## 6 Servicing/Maintenance

### 6.1 Safety regulations

The operator ensures that maintenance, inspection and installation are performed by authorised, qualified specialist personnel who are thoroughly familiar with the manual.

|  |  |
|--|--|
|  | <p><b>⚠ WARNING</b></p>  |
|  | <p><b>Fluids and supplies posing a health hazard and/or hot fluids and supplies</b><br/> Risk of injury!</p> <ul style="list-style-type: none"> <li>▷ Observe all relevant laws.</li> <li>▷ Decontaminate lifting accessories which have been used in fluids posing a health hazard.</li> <li>▷ When handling hazardous fluid take appropriate measures to protect persons and the environment.</li> </ul> |

|  |   |
|--|---|
|  | <p><b>⚠ WARNING</b></p>   |
|  | <p><b>Insufficient stability</b><br/> Risk of crushing hands and feet!</p> <ul style="list-style-type: none"> <li>▷ During assembly/dismantling, secure the lifting accessory against overturning or tipping over.</li> </ul> |

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

|  |  |
|--|--|
|  | <p><b>NOTE</b></p>   |
|  | <p>All maintenance work, service work and installation work can be carried out by KSB Service or authorised workshops. For contact details please refer to the enclosed "Addresses" booklet or visit "<a href="http://www.ksb.com/contact">www.ksb.com/contact</a>" on the Internet.</p> |

Never use force when dismantling and reassembling the equipment.

|  |  |
|--|--|
|  | <p><b>CAUTION</b></p>  |
|  | <p><b>Use of impermissible spare parts</b><br/> Damage to the machinery!</p> <ul style="list-style-type: none"> <li>▷ Never use spare parts which do not meet the technical requirements.</li> </ul> |

### 6.2 Maintenance/inspection

KSB recommends the following regular servicing schedule:

**Table 8:** Overview of maintenance work

| Maintenance interval | Maintenance work   |
|----------------------|--|
| Annually             | General visual inspection, measurement and verification of dimensions against the reference dimension to be performed by competent persons in accordance with the BGR 500 / GUV regulations (health and safety regulations of the German trade association and statutory accident insurance requirements). |

- Reference dimensions**
- Deep Lift System DLS-4: (⇒ Section 8.2.2, Page 28)
  - Deep Lift System DLS-15: (⇒ Section 8.2.3, Page 28)

Permissible deviation to DIN 15429 (section 5.1)  $\leq 10 \%$ . Any parts with a greater deviation must be replaced.

**Maintenance work**

- Lubricate the moving parts.
- Check that the moving parts can move freely.
- Check the spring tension.
- Check for any damage.

**6.3 Cleaning**

|   |   |
|---|---|
|  |  <b>WARNING</b>  |
|   | <p><b>Fluids handled, consumables and supplies which are hot and/or pose a health hazard</b></p> <p>Hazard to persons and the environment!</p> <ul style="list-style-type: none"> <li>▷ Collect and properly dispose of flushing fluid and any fluid residues.</li> <li>▷ Wear safety clothing and a protective mask if required.</li> <li>▷ Observe all legal regulations on the disposal of fluids posing a health hazard.</li> </ul> |

If the fluids the lifting accessories have been used in leave residues which might lead to corrosion damage when coming into contact with atmospheric humidity, or which might ignite when coming into contact with oxygen, the lifting accessories must be flushed, neutralised, and treated with anhydrous inert gas for drying purposes.

**6.4 Spare parts stock**

**6.4.1 Ordering spare parts**

Always quote the following data when ordering replacement or spare parts:

- Order number
- Order item number
- Type series
- Size
- Material variant
- Year of construction

Refer to the name plate for all data.

Also specify the following data:

- Part number and description
- Quantity of spare parts
- Shipping address
- Mode of dispatch (freight, mail, express freight, air freight)

## 7 Trouble-shooting

|   |   |
|---|---|
|  |  <b>WARNING</b>  |
|   | <p><b>Improper work to remedy faults</b></p> <p>Risk of injury!</p> <ul style="list-style-type: none"> <li>▷ For any work performed to remedy faults, observe the relevant information given in this operating manual and/or in the product literature provided by the accessories manufacturer.</li> </ul> |

If problems occur that are not described in the following table, consultation with the KSB service is required.

**Table 9:** Trouble-shooting

| Fault   | Possible cause  | Remedy                                     |
|---|---|--|
| The pump cannot be hooked on.                                     | The hook is jammed or does not move into its closed position / open position. | Clean and oil the parts.                   |
| The spring is not working.  | Defective spring or deposits on the spring                                    | Clean the spring. Replace it if necessary. |
| The lifting accessory is not correctly positioned on the bail.    | Deformed guide plate  | Repair the guide plate                     |
| The hook does not engage into the bail.                           | Encrusted bail or severely contaminated bail                                  | Clean the bail.                            |
| The parts cannot be fastened in accordance with the instructions. | The screws are missing.   | Procure the screws specified.              |

## 8 Related Documents

### 8.1 General assembly drawing with list of components

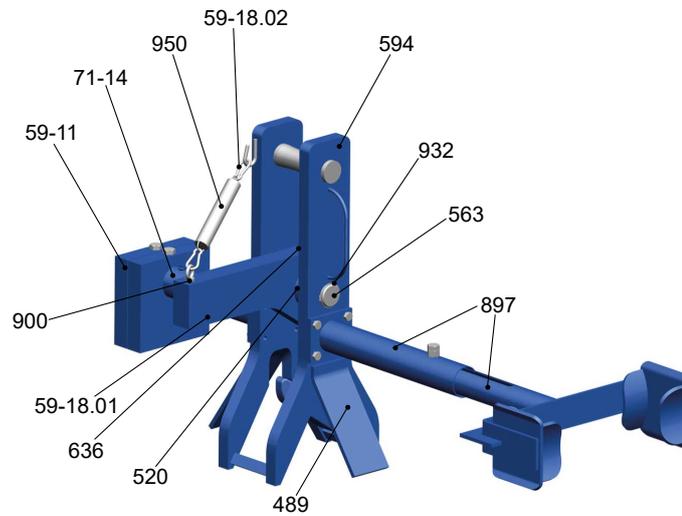


Fig. 11: General assembly drawing

Table 10: List of components

| Part No. | Description   | Part No. | Description        |
|----------|---------------|----------|--------------------|
| 489      | Guide plate   | 636      | Lubricating nipple |
| 520      | Sleeves       | 71-14    | Connection pipe    |
| 563      | Bolt/stud     | 897      | Guide piece        |
| 59-11    | Weights       | 900      | Eyebolt            |
| 59-18.01 | Hook          | 932      | Circlip            |
| 59-18.02 | Hook          | 950      | Spring             |
| 594      | Support frame |          |                    |

## 8.2 Dimensions

### 8.2.1 Bail for Deep Lift System

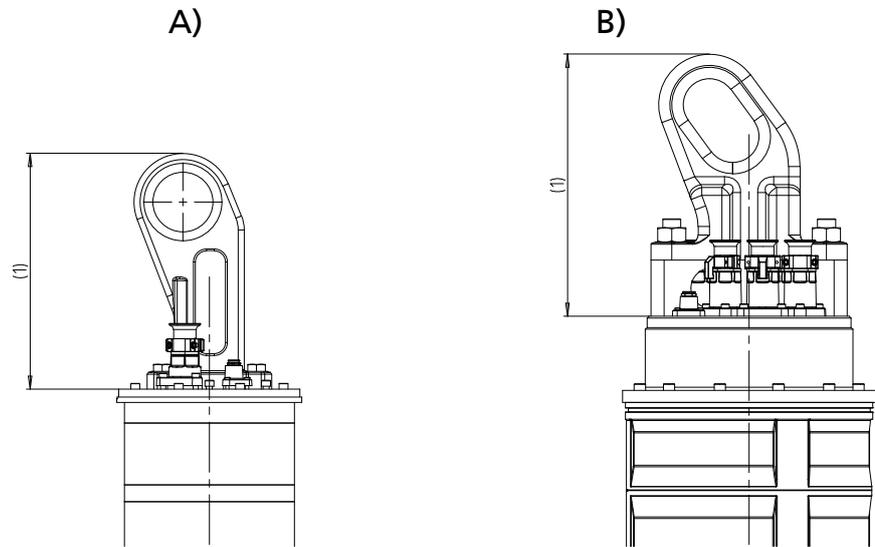


Fig. 12: Bails A and B

Table 11: Bail dimensions

| Motor type  | Weight<br>[kg] | Bail type A or type B | Dimension 1<br>[mm] |
|---|----------------|-----------------------|---------------------|
| 35 4 N...175 4 N<br>32 6 N...165 6 N<br>26 8 N...130 8 N<br>40 10 N...90 10 N | < 4000         | A                     | 630                 |
| 200 4 N...350 4 N<br>190 6 N...260 6 N<br>150 8 N...220 8 N                   | < 4000         | B                     | 730                 |
| 110 10 N...190 10 N<br>105 12 N...165 12 N                                    | < 12500        | B                     | 780                 |
| 320 6 N...850 6 N<br>260 8 N...760 8 N  | < 4000         | B                     | 730                 |
| 230 10 N...660 10 N<br>195 12 N...560 12 N                                    | < 12500        | B                     | 700                 |

8.2.2 Deep Lift System DLS-4

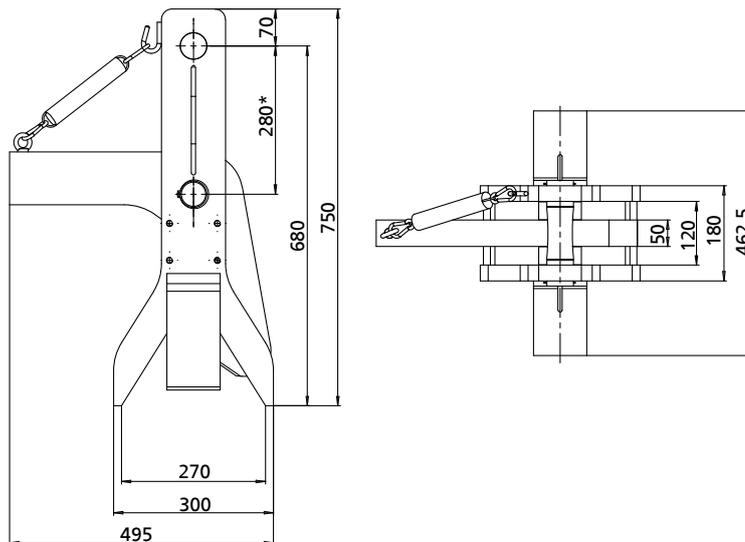


Fig. 13: Dimensions of Deep Lift System DLS-4 [mm]

|   |                     |
|---|---------------------|
| * | Reference dimension |
|---|---------------------|

8.2.3 Deep Lift System DLS-15

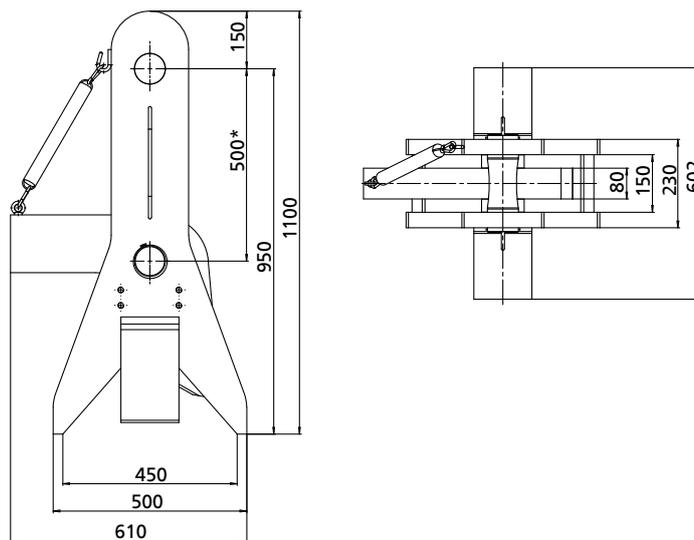


Fig. 14: Dimensions of Deep Lift System DLS-15 [mm]

|   |                     |
|---|---------------------|
| * | Reference dimension |
|---|---------------------|

## 9 EU Declaration of Conformity

Manufacturer: **KSB SE & Co. KGaA**  
**Johann-Klein-Straße 9**  
**67227 Frankenthal (Germany)**

The manufacturer herewith declares that the product:

### Deep Lift System

KSB order number: .....

- is in conformity with the provisions of the following Directives as amended from time to time:
  - Lifting accessory: EC Machinery Directive 2006/42/EC

The manufacturer also declares that

- the following harmonised international standards have been applied:
  - ISO 12100
  - EN 13155
- Applied national technical standards and specifications, in particular:
  - BGR 500 section 2.8

Person authorised to compile the technical file:

Name  
Function  
Address (company)  
Address (street, No.)  
Address (post or ZIP code, city) (country)

The EU Declaration of Conformity was issued in/on:

Place, date

.....<sup>3)</sup>.....

Name  
Function  
Company  
Address

---

3) A signed, legally binding EU Declaration of Conformity is supplied with the product.

---

## 10 Certificate of Decontamination

Type: .....

Order number/ .....

Order item number<sup>4)</sup>: .....

Delivery date: .....

Applications: .....

Fluid handled<sup>4)</sup>: .....

Please tick where applicable<sup>4)</sup>:




Corrosive




Oxidising




Flammable




Explosive




Hazardous to health




Seriously hazardous to health




Toxic




Radioactive




Bio-hazardous




Safe

Reason for return<sup>4)</sup>: .....

Comments: .....

.....

The product/accessories have been carefully drained, cleaned and decontaminated inside and outside prior to dispatch/ placing at your disposal.

We herewith declare that this product is free from hazardous chemicals, biological and radioactive substances.

For mag-drive pumps, the inner rotor unit (impeller, casing cover, bearing ring carrier, plain bearing, inner rotor) has been removed from the pump and cleaned. In cases of containment shroud leakage, the outer rotor, bearing bracket lantern, leakage barrier and bearing bracket or intermediate piece have also been cleaned.

For canned motor pumps, the rotor and plain bearing have been removed from the pump for cleaning. In cases of leakage at the stator can, the stator space has been examined for fluid leakage; if fluid handled has penetrated the stator space, it has been removed.

- No special safety precautions are required for further handling.
- The following safety precautions are required for flushing fluids, fluid residues and disposal:

.....

.....

We confirm that the above data and information are correct and complete and that dispatch is effected in accordance with the relevant legal provisions.

.....  
Place, date and signature

.....  
Address

.....  
Company stamp

4) Required fields

## Index

### C

Certificate of Decontamination 30

### D

Designation 12

Disposal 11

### E

Event of damage 5

Ordering spare parts 24

### F

Faults

Causes and remedies 25

### K

Key to safety symbols/markings 5

### M

Maintenance 23

Maintenance work 23

### O

Order number 5

Other applicable documents 5

### P

Personnel 7

### Q

Qualifications 7

### R

Return to supplier 10

### S

Safety 7

Safety awareness 8

Spare part

Ordering spare parts 24

Specialist technical personnel 7

Storage 10

### T

Tightening torques 14

Training 7

Transport 9

### W

Warnings 5

Warranty claims 5





**KSB SE & Co. KGaA**

Johann-Klein-Straße 9 • 67227 Frankenthal (Germany)

Tel. +49 6233 86-0

[www.ksb.com](http://www.ksb.com)



**KSB SE & Co. KGaA**

Turmstraße 92 • 06110 Halle (Germany)

Tel. +49 345 4826-0

[www.ksb.com](http://www.ksb.com)