

# **EURO VERBAU**

Verbau-, Ramm- und Tiefbautechnik

## **Operating Manual**

## **Pipe Pulling Machine**

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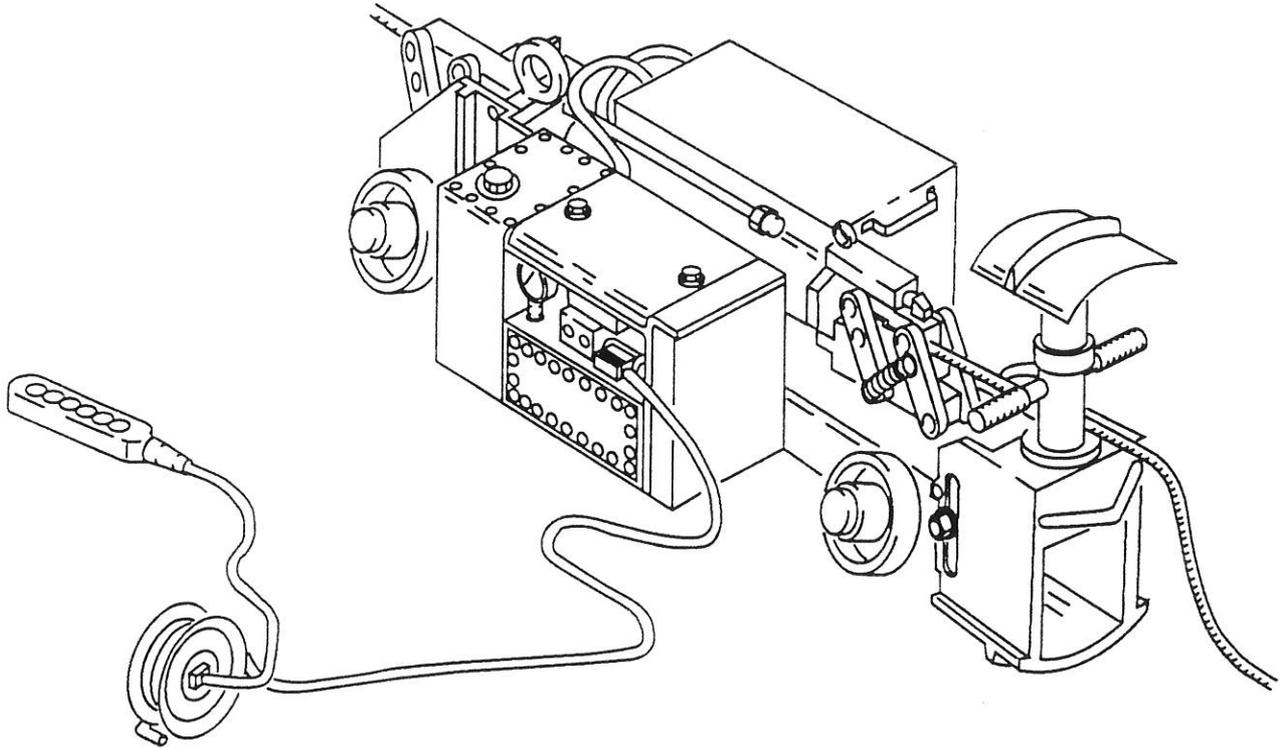
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# Operating Manual KRINGS Maschinenbau KRINGS Pipe Pulling Machine



TBG - Approval Number 90622

Type: \_\_\_\_\_

Year of:  
Manufacture \_\_\_\_\_

Serial No.: \_\_\_\_\_

Order No.: \_\_\_\_\_

Customer: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



# Operating Manual

## KRINGS Maschinenbau

### KRINGS - Pipe Pulling Machine

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## PRELIMINARY REMARKS

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### Preamble

Subject to textual changes.

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Printing key:

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Edition 2

March 1993

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We recommend to keep the Operating Manual for the pipe pulling machine at a suitable place to ensure a direct access in case of any possible questions.

Thus, always carefully store this Operating Manual; you may need it for the following future purposes:

- When changing the installation site
- When changing machine components
- For the operation, maintenance and inspection of the equipment
- For training purposes
- For self-study



# Operating Manual KRINGS Maschinenbau KRINGS - Pipe Pulling Machine

## INTRODUCTION AND GENERAL INFORMATION

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### Introduction

This Operating Manual is designed to assist the operating, supervising and servicing staff of the pipe pulling machine.

The Manual contains an extensive description of the individual operating steps, detailed information to commission and to start-up again all installations and equipment connected to the machine, as well as instructions for maintenance and servicing to the extent such work is carried out by the operating staff.

In case of faults you are unable to cope with, please contact our Service Department.

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52525 Heinsberg-Dremmen

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### Liability and Performance Guarantee

Any and all information and instructions with respect to the operation and maintenance of the machine are given on account of the experience made so far and to the best of our knowledge and belief.

We shall only be liable for any possible faults or failures, with the exclusion of any further claims, within the scope of the warranty obligations incurred in the Main Contract. Any further claims for damages, irrespective of the legal basis for such claims, are excluded.



# Operating Manual KRINGS Maschinenbau KRINGS - Pipe Pulling Machine

## Liability and Performance Guarantee (Continued)

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Translations, too, are made to the best of our knowledge and belief. We shall not be liable with regard to any faults in translation; even though such translation has been carried out by us or on our behalf. The German wording shall be the binding version. If required, we will submit to you a German copy.

The disclosure of the Operating Manual to third parties is prohibited and will be subject to claims for damages.



A liability or guarantee is excluded:

- if failing to adhere to the information and instructions given in the Operating Manual,
- in case the pipe pulling machine, including the related equipment, are incorrectly operated or in case the handling does not correspond to the procedures stipulated,
- in case the machine is used for purposes other than the applications stated,
- in case protective devices are not used or are put out of function,
- in case functional changes of any type are effected without our written consent,
- if failing to follow the relevant safety instructions (see respective section in this Operating Manual),
- if the machine, including the related equipment, is incorrectly maintained or serviced (service intervals as well as service procedures) (this also includes the use of the specified spare parts).



Only use genuine spare parts or parts approved by manufacturer when replacing parts or purchasing spares. In case of nonfulfilment of this provision, the liability and performance guarantee will not apply.



# Operating Manual

## KRINGS Maschinenbau

### KRINGS - Pipe Pulling Machine

#### General Information to Understand and to use this Operating Manual

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1. Upon handing over this Manual, the manufacturer has explained to you the operation and maintenance and servicing of the pipe pulling machine. Before commissioning the pipe pulling machine, though, read this Operating Manual carefully. Under all circumstances, follow the designated safety instructions given!
2. Please do not put aside this Operating Manual without reading it, although you might have operated this or a similar type of equipment before.
3. The pipe pulling machine supplied to you corresponds in its design and manufacture to **KVH-Maschinenbau GmbH- as well as to the UVV regulations**. In order to avoid any accidents and to ensure an optimum performance, no modifications or changes shall be made to the pipe pulling machine unless such modifications or changes have been expressly approved by the **KVH-Maschinenbau GmbH**.
4. Important information, such as safety-relevant instructions, are designated through respective symbols.
5. Strictly follow these instructions in order to avoid any accidents and damage to machines or personal injuries (see following page for designation of symbols).
6. In addition, the operator of the equipment must take into account the applicable environmental protection regulations as well as the respective obligations for a proper disposal (such as oils, greases, cleaning agents).
7. This Manual contains the internationally standardised SI measuring units.
8. All information given in brackets (./..) in the following sections refer to explanations referring to the pages indicated.
9. Any passages marked with an \* (asterix) are options meant to supplement or extend the standard function. Depending on the scope of your order, such descriptions may have to be taken into account.



# Operating Manual KRINGS Maschinenbau KRINGS - Pipe Pulling Machine

## Meaning of Symbols Used in this Operating Manual

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Danger signal



Warning - Suspended Load



Information



# Operating Manual KRINGS Maschinenbau KRINGS - Pipe Pulling Machine

## TRANSPORT, INSTALLATION AND PREPARATION OF READINESS FOR OPERATION

3/1

### General Information

In general, the pipe pulling machine is shipped in a sturdy transport box. The transport box contains - according to your order:

- the complete pipe pulling machine with mounted adjustable spindle, equipped with a 12 V battery and integrated hydraulic control unit
- the control cable with connector and control panel
- various different fitments and hardware



It is recommended to immediately inspect all of the parts delivered for completeness and possible damages through transport. The attached shipping note and accompanying documentation will assist you for this purpose.



In general, any claims will only be considered if reported to the carrier or to **KVH - Maschinenbau GmbH** on the day of receipt of the machine.

### Transport of Pipe Pulling Machine

Transport pipe pulling machine to operating site according to graph by using crane or equivalent lifting gears (excavator) as well as suitable transporting gears. Sequence of operation: (see following page).



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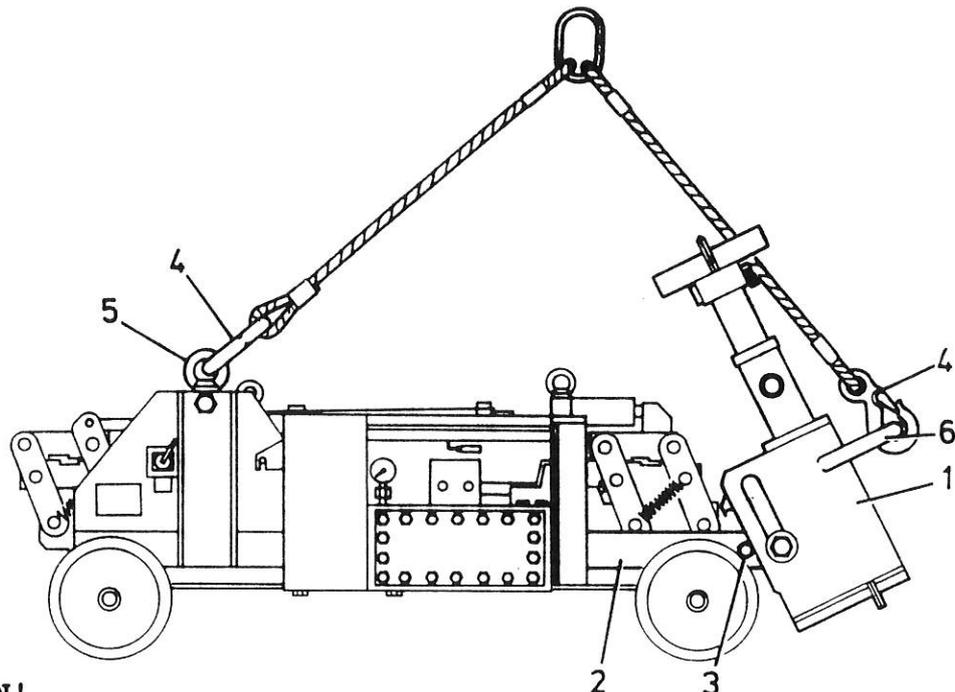
## KRINGS Maschinenbau

### KRINGS - Pipe Pulling Machine

#### Transport of Pipe Pulling Machine (Continued)

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- Dump adjustable spindle (1) onto pipe cart (2) and allow to catch behind the safety bolts (3) installed on both sides.
- The hooks of the 2-leg load distributing harness (4) are hooked into the lifting-eye nut (5) and into the receptacle hook (6). The pipe pulling machine may now be transported freely suspended at the upper eye of the 2-leg load distributing harness by using suitable lifting gears.
- Lift up pipe pulling machine and check whether in "horizontal" position. If not, put down machine and adjust position.
- Transport pipe pulling machine to operating site and put down.
- Make sure that machine hanging on crane is not touching any other obstacles during transport.
- Remove 2-leg load distributing harness.



#### CAUTION!

The stay underneath suspended loads and within the swivelling range of excavators and cranes is forbidden! Machine weight approx. 440 kg. Lifting gears must match weight!



KRINGS MASCHINEN

# Operating Manual KRINGS Maschinenbau KRINGS - Pipe Pulling Machine

## Preparation of Readiness for Operation

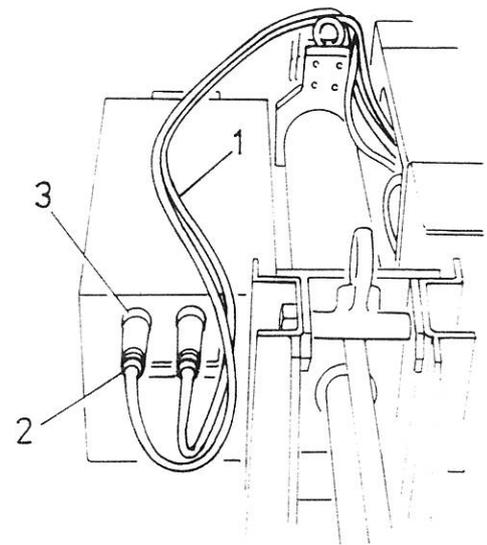
3/3

The manufacturer has handed over to you the machine in a prepared condition. This means:

- with a charged battery
- with a fill of hydraulic oil

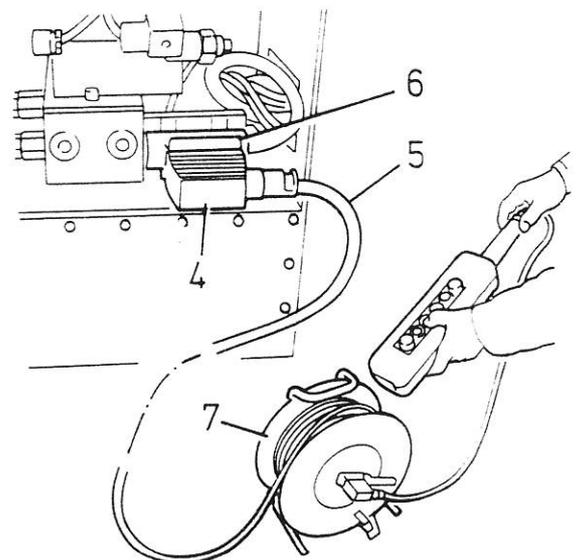
Carry out the following work to have machine fully operational:

- Connect power supply cable (1) with correct plugs (2) and bushes (3) of power unit protected against reverse connection.
- Insert plug (4) of control cable (5) into socket (6) of pipe pulling device and secure or - depending on site conditions - connect control cable to cable drum (7) and this to socket of pipe pulling device.



### Caution!

The pipe pulling machine may only be operated with cable drum connected! Unroll sufficient length of cable. The operation within the danger area of the tensed hauling cable is forbidden! It is strictly forbidden to operate the KRINGS pipe pulling machine inside a pipe!



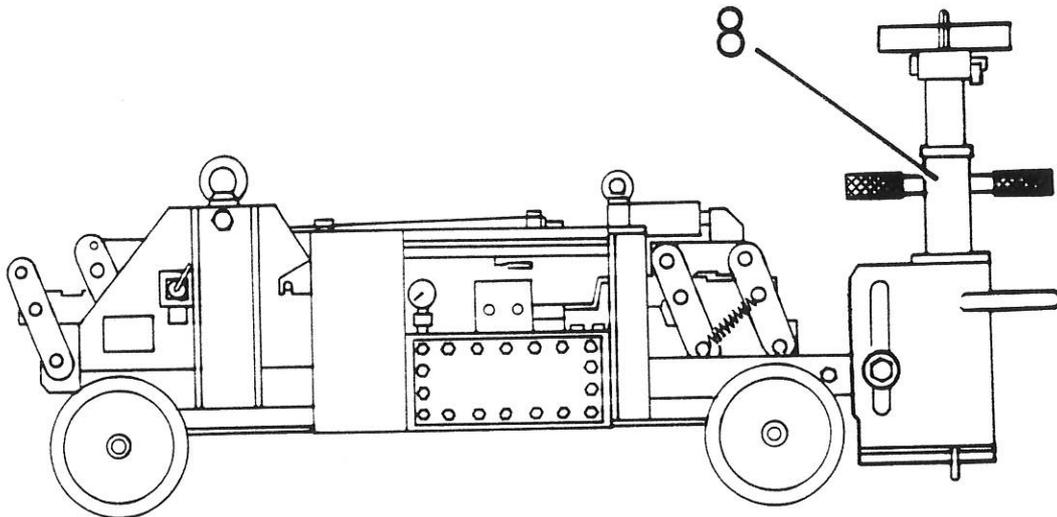


# Operating Manual KRINGS Maschinenbau KRINGS - Pipe Pulling Machine

## Preparation of Readiness for Operation (Continued)

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- In addition, bring adjustable spindle (8) to vertical position.



The pipe pulling machine is now ready for service and must be adjusted in height and on site to the pipe diameter pulled (also see Section 7).

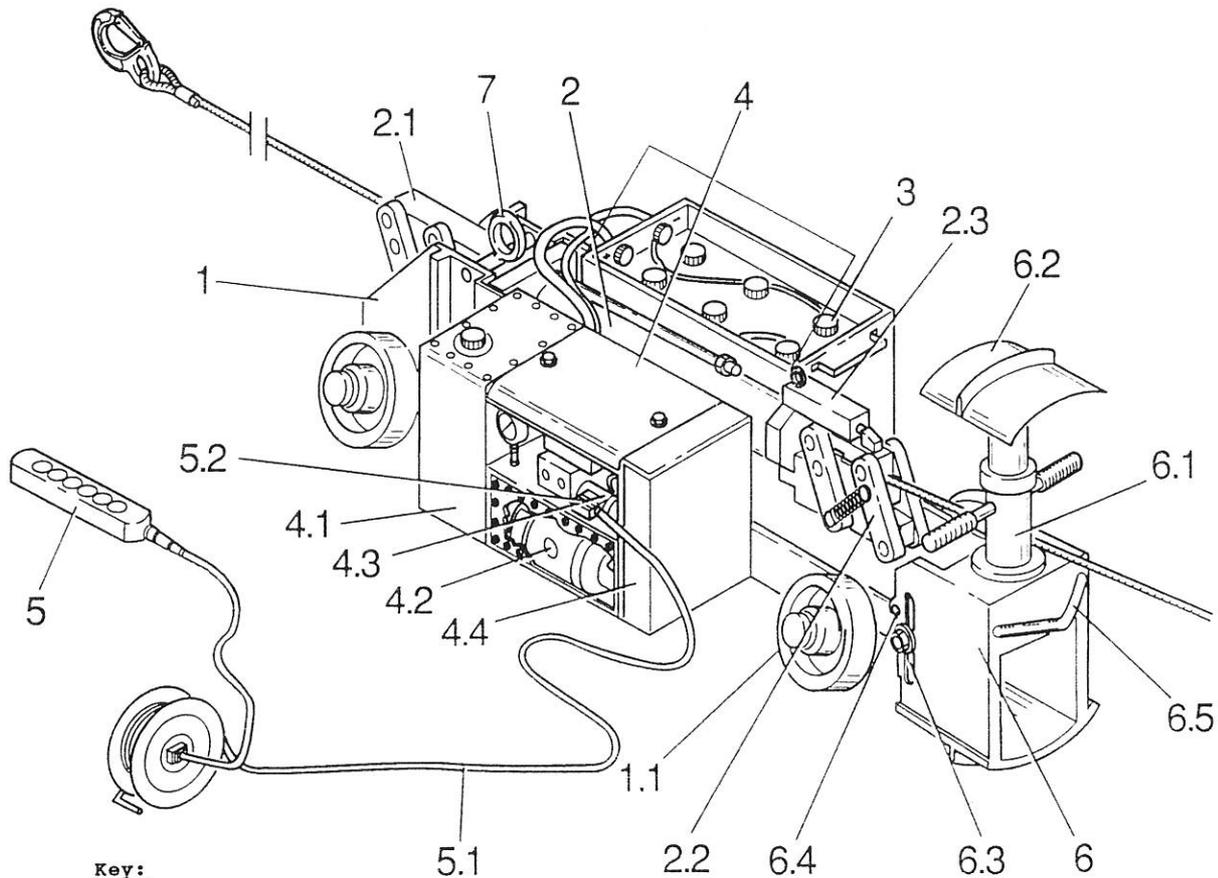


# Operating Manual KRINGS Maschinenbau KRINGS - Pipe Pulling Machine

## FUNCTIONAL DESCRIPTION, SUMMARY OF STRUCTURAL COMPONENTS AND TECHNICAL DATA

4/1

### Graph of Pipe Pulling Machine



**Key:**

1 = Pipe cart with

1.1 Running gear

2 = Hydr. pull cylinder with

2.1 front clamping jaw,

2.2 rear clamping jaw and

2.3 hydr. opening cylinder

3 = Battery box

4 = Driving unit

4.1 Oil container,

4.2 Hydraulic unit

4.3 Connection for control cable

4.4 Electrical cabinet

5 = Control unit with  
Cable drum

5.1 Control cable and

5.2 Connecting plug

6 = Adjustable spindle with

6.1 Rotating spindle,

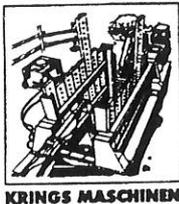
6.2 Screw jack,

6.3 Tilting device with

6.4 Safety screw-in bolts,

6.5 Transporting hook

7 = Eye for transporting purposes



# Operating Manual

## KRINGS Maschinenbau

### KRINGS - Pipe Pulling Machine

#### Functional Description of Pipe Pulling Machine

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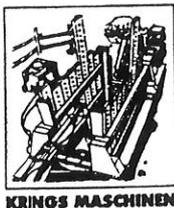
The compact design as well as the integrated functional components of the pipe pulling machine allow an economic disconnection and connection of pipes of any type, such as concrete pipes, stoneware pipes etc. of various different diameters.

The pipe pulling machine consists of the following structural components:

1. Running gear
2. Hydraulic pulling cylinder with double-clamp jaw (front and rear) and hydraulic opening cylinder
3. Battery box
4. Driving unit
5. Adjustable spindle
6. Extension pipe, compl.\*
7. Control panel incl. control cable and connecting plug
8. Eyes for transporting purposes
9. Accessories

The welded-type pipe cart is designed to take up all structural components described above and is equipped with inclined hard rubber wheels. This inclined design enables optimum driving characteristics of the pipe pulling machine inside a pipe.

The pulling cylinder, together with mounted clamping cylinder and front- and rear clamping jaws is installed and fixed in the centre of the pipe cart. The maximum operating stroke of the pulling cylinder, i.e. the pulling length of the pipe pulling machine is 500 mm per operating cycle. The battery box mounted to the side is used for the 12V/160/180Ah battery and is equipped with outside + and - connectors connected by cable to the switch cabinet located at the other side. The driving unit is also installed on the other side.



# Operating Manual

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### KRINGS - Pipe Pulling Machine

#### Functional Description of Pipe Pulling Machine (Continued)

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This unit consists of an hydraulic control block with solenoid valve as well as an electro-hydraulic pump with pressure gauge installed underneath. This unit is used to carry out the pulling process or the opening or closing of the clamping jaws after entering the respective control commands through the control panel.

The pulling element is an 18 mm steel hauling cable with a load hook at one side and a tapered and brazed end at the other side.

The steel hauling cable is fixed with the mounted hook to the 2-leg load distributing harness. The 2-leg load distributing harness is hooked to the outer eyes of the pulling bar chosen. A helper positions the pulling bar into the pipe to be pulled and holds it until the first pull. The helper **must** leave the trench during the actual pulling process! The other, tapered end of the steel cable, is fed through the opened clamping jaws of the front clamping jaws, through the cylinder as well as through the open rear clamping jaws.

The adjustable spindle serves as a heel to be positioned through a threaded spindle with trapezoid threading, namely vertically inside the pipe bush with its support. We would like to expressly point out that the adjustable spindle may only be equipped with one extension pipe each.

When pushing the respective operating buttons, the hydraulic hauling cylinder retracts. The clamping jaws close automatically and the pipe to be pulled is brought in position through the steel cable.

See page 7/1 fol. for the individual steps of the pulling process.



# Operating Manual

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### KRINGS - Pipe Pulling Machine

#### Technical Data of Pipe Pulling Machine

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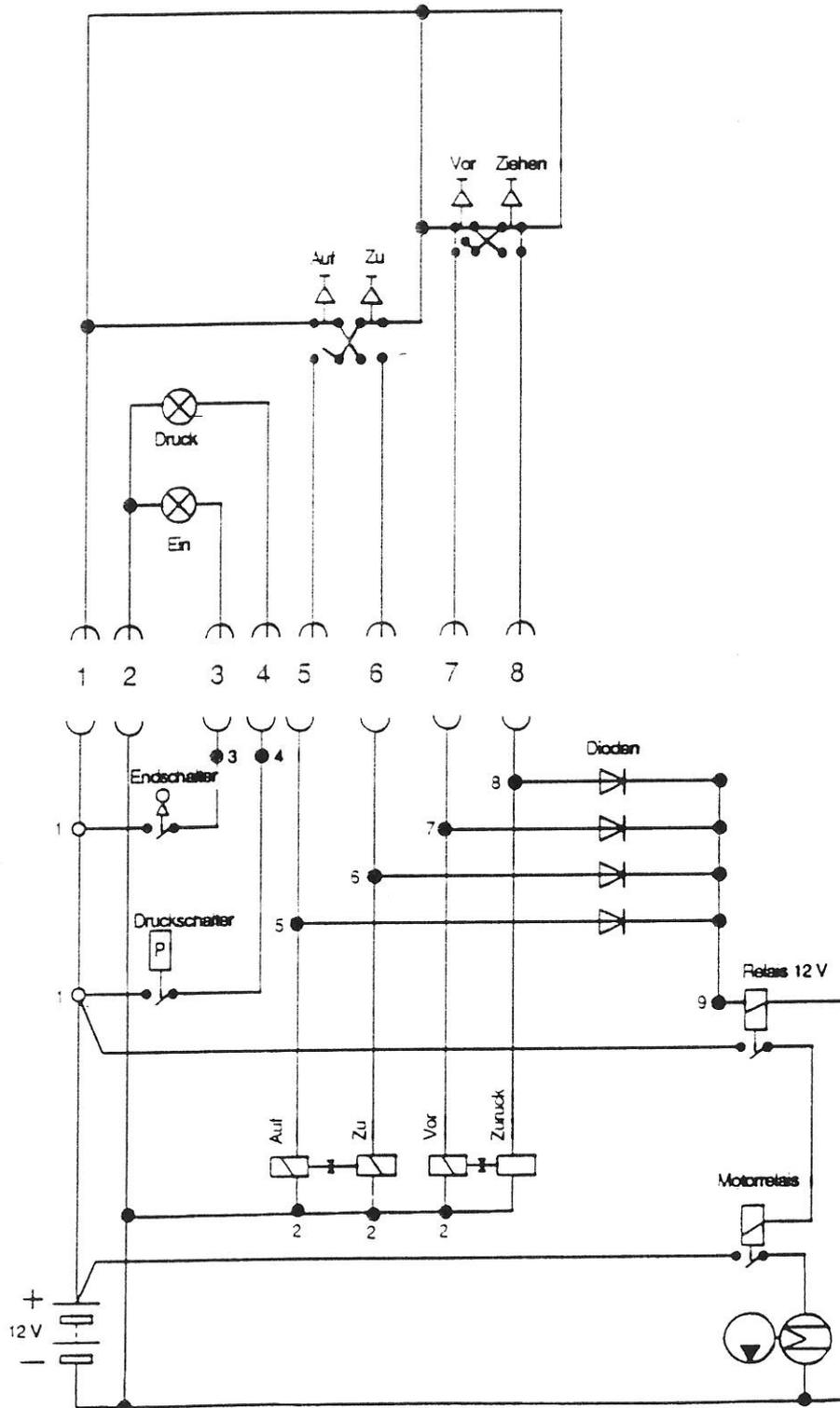
Suitable for pipe diameters:	800 - 2400 mm
Steel hauling cable with load hook	
Diameter:	18 mm
Length:	35 m (50 m, 60 m)
Pulling cylinder, working path (stroke):	500 mm
Electro-hydraulic gear pump:	1.4 KW; 2200 min <sup>-1</sup> ; 12 V
Operating pressure:	max. 160 bars
Max. pull:	107 kN
Hydraulic oil:	HLP-D 32/ 46
Amount of oil:	15 l
Power supply:	Battery; 12 V / 160/180
Ah	
Total weight:	approx. 440 kg
Splash-proof construction,	
Paint:	yellow acc. to RAL 1004 red acc. to RAL 2002



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## Wiring Diagram

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# Operating Manual KRINGS Maschinenbau KRINGS - Pipe Pulling Machine

## SAFETY REGULATIONS

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### General Information

The regulations, instructions and safety regulations referred to in this Section must be strictly followed.



The machine shall only be operated by persons trained or instructed, respectively. Any lack in knowledge may lead to damages to the machine or to risks for operating staff.

Definitions of users:

- a) A skilled person is a person who is - due to his technical training, knowledge and experience as well as due to his knowledge of the relevant regulations - able to assess the work assigned to him and to anticipate possible risks involved.
- b) A trained person is a person who has been instructed with regard to the tasks assigned to him and to possible risks involved resulting from improper attitude and who might have been trained as well as instructed with regard to the necessary protective devices and - measures.
- c) A non-professional person is a person not qualified pursuant to paragraphs a) or b).



This applies, in particular, to maintenance and repair work as well as to troubleshooting and fault elimination.

Before using the machine, the operating- and servicing staff must be extensively familiarised with the machine and its components. Before commissioning the machine, staff members must participate in a safety training pointing out danger spots. This safety training must be repeated, if required.



# Operating Manual

## KRINGS Maschinenbau

### KRINGS - Pipe Pulling Machine

#### Specific Safety Instructions

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In case of acting inside the machine - i.e. in case of maintenance-, adjusting- and servicing work - all power drives actuating a dangerous movement must be disconnected from the energy source (such as motors, conveying devices, cylinders etc.).

All operating- and control elements as well as shutting- and control fittings of the machine shall only be operated by trained and authorised staff.

Avoid any stumbling spots - such as cables - or, if such obstacles cannot be avoided, mark with respective two-colour adhesive tape (warning symbol).

-  Immediately treat any injuries - also small wounds - due to possible infection risks involved.
-  Always keep traffic- and escape ways free from any obstacles.
-  Any accident (personal injury or damage to property) must be immediately reported to the supervisor and to the safety inspector.

The machine is designed in such a way as to follow the existing, applicable rules and safety regulations for the prevention of accidents for the operation for the authorized applications and carried out by professional and trained staff.



#### Caution:

Make sure that *nobody* is within the danger area of the tensed hauling cable during the pulling process.



In addition, we would like to point out that the pipe pulling machine should only be used for the authorized applications. Only use "**Genuine Krings Spare Parts**". In case of nonfulfilment of this provision, the liability and performance guarantee will not apply.



# Operating Manual KRINGS Maschinenbau KRINGS - Pipe Pulling Machine

## Specific safety instructions (Continued)

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### Note:

- Otherwise, all regulations of the TBG (Trade Association of Civil Engineering) apply as well as
- the DIN 4124 standards "Building pits and trenches, slopes, working space widths and sheeting"
- Our products bear the TBG-GS symbol = "Approved Safety"



# Operating Manual KRINGS Maschinenbau KRINGS - Pipe Pulling Machine

## OPERATING- AND CONTROL ELEMENTS AND THEIR MEANING

6/1

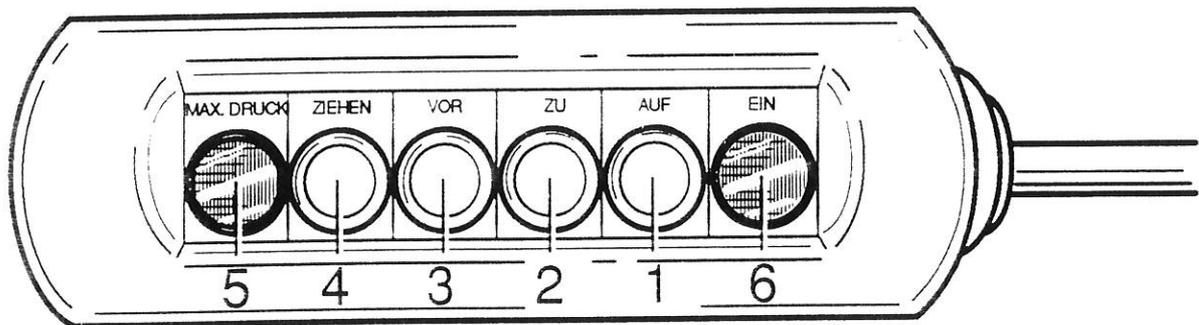
### General Information

Before commissioning machine, make yourself familiar with the meaning and function of the operating- and control elements.

You thus increase the safety at and the quality of your work and you prevent, at the same time, any faulty operation of the machine which might lead to a damage to the machine or to an injury of persons.

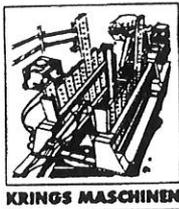
The function and meaning of such elements are described in detail in the following Section.

### Meaning of Operating Elements of Control Panel



#### Pos. Operating- and Control Element Explanations

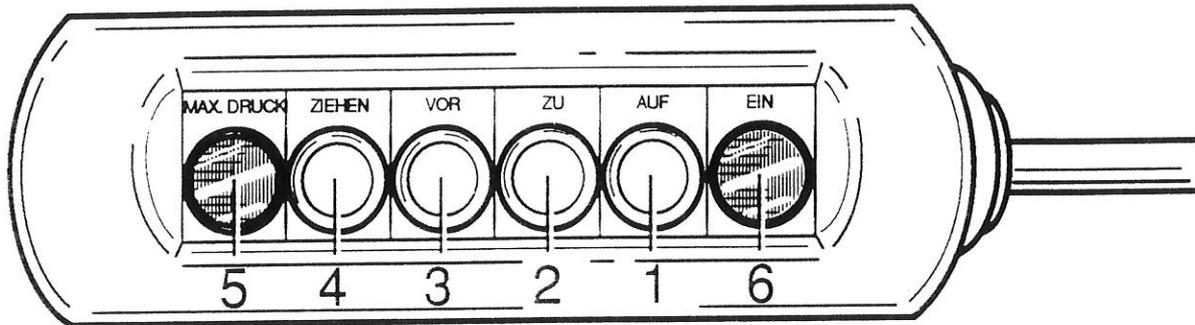
- |   |                           |   |
|---|---------------------------|---|
| 1 | White pushbutton<br>"AUF" | When using the "AUF" button, the rear clamping jaw opens up and the signalling lamp shows that the rear clamping jaws are fully open. |
| 2 | Black pushbutton<br>"ZU"  | When using the "ZU" button, the rear clamping jaw closes and the signalling lamp 5 indicates that the clamping jaw is fully closed.   |



# Operating Manual KRINGS Maschinenbau KRINGS - Pipe Pulling Machine

## Meaning of Operating Elements of Control Panel (Continued)

6/2



### Pos. Operating- and Control Element Explanations

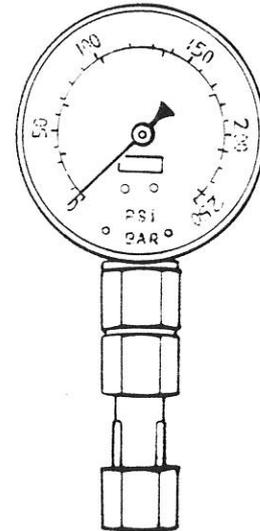
- |   |   |   |
|---|---|---|
| 3 | White pushbutton  | When using the white "VOR" push-button, the hauling cylinder extends. When reaching its end stop position, the front clamping jaw opens up and signalling lamp 5 indicates that the cylinder is fully extended. |
| 4 | Black pushbutton<br>"ZIEHEN"                                    | When using the black "ZIEHEN" push-button, the hauling cylinder retracts again. Its end stop position is again indicated by signalling lamp   |
| 5 | Yellow signal lamp<br>"MAX. DRUCK" as<br>well as multi-function | The functions of this signal lamp have already been described before. This lamp will also come on, if the display the set operating pressure of 160 bars is reached.  |
| 6 | White signal lamp<br>"EIN"                                      | This signal lamp comes on at the time another approx. 120 mm of stroke is left during the hauling process. This signal is triggered by a limit switch signalling the stroke of the cylinder.                    |

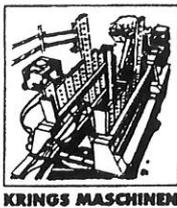


# Operating Manual KRINGS Maschinenbau KRINGS - Pipe Pulling Machine

## Control Element Hydraulic Pressure Gauge (Pressure Gauge) 6/3

The hydraulic pressure gauge is a round pointer instrument with two scales in bars and psi. The measuring range is between 0 - 250 bars or 0 - 35,000 psi. The electro-hydraulic control unit has a pressure limit of 160 bars set ex works. When reaching this pressure, the yellow signalling lamp "Max. Druck" on the control panel lights up. This may be checked with the pressure gauge for maintenance purposes (9/1 f.) and for troubleshooting (8/1 f.). During normal operation, this pressure gauge cannot be inspected because it is inside the pipe together with the pipe pulling machine.





# Operating Manual

## KRINGS Maschinenbau

### KRINGS - Pipe Pulling Machine

#### COMMISSIONING, OPERATION AND SUPERVISION

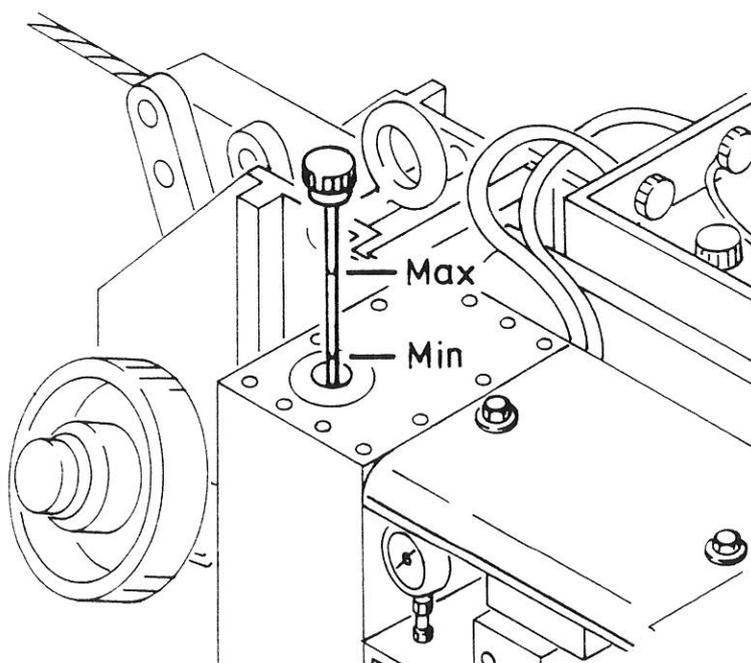
7/1

#### General Information

Provided you read and understood the preceding sections of this Manual, you may now start to commission the pipe pulling machine.

#### Daily routine check-ups:

- Check-up function of all relevant operating- and control elements.
- Before starting-up machine, make sure that a trouble-free mechanical operation is guaranteed..
- Do all respective end switches work?
- Have all bearing points to be lubricated been checked for sufficient fill of grease? (see maintenance instructions in Section 9).
- Has the battery been charged with the battery charger to its full capacity?
- Check for sufficient fill of hydraulic oil. (Check-up through oil dip rod, see figure).





# Operating Manual KRINGS Maschinenbau KRINGS - Pipe Pulling Machine

## Commissioning

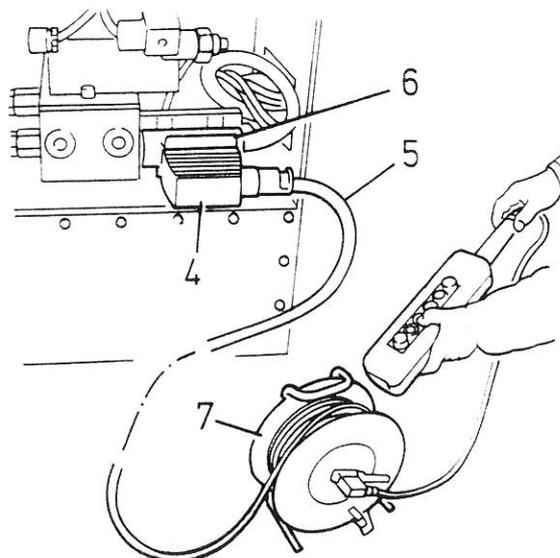
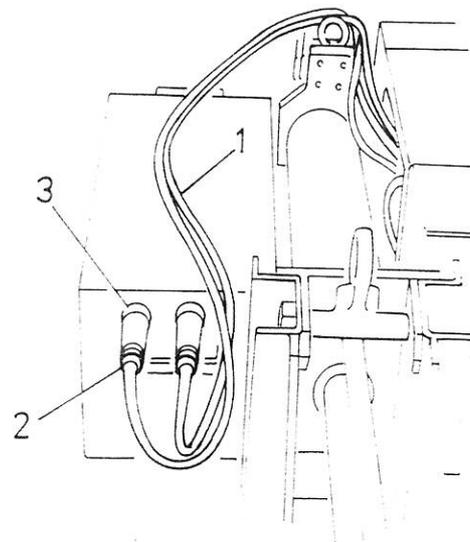
7/2

Upon completion of all check-ups listed before and provided no problems show, continue as follows:

- The pipe pulling machine is supplied in a pre-assembled condition. The battery is charged, the hydraulic oil is filled up.
- No specific measures have to be taken for commissioning.

## Operation

- Make pipe pulling machine ready for operation. For this purpose, connect power supply cable (1) to respective plugs (2) and reverse-protection bushes (3) of the power pack (see figure). Afterwards, insert plug (4) of control cable (5) into socket (6) of pulling cable and secure. Connect control cable to control panel (see figure).
- Carry out daily routine check-ups (7/1).
- Bring pipe pulling machine ready for operation into excavated trench by using suitable lifting gears (see 3/2). Run pipe pulling machine into a pipe already laid.

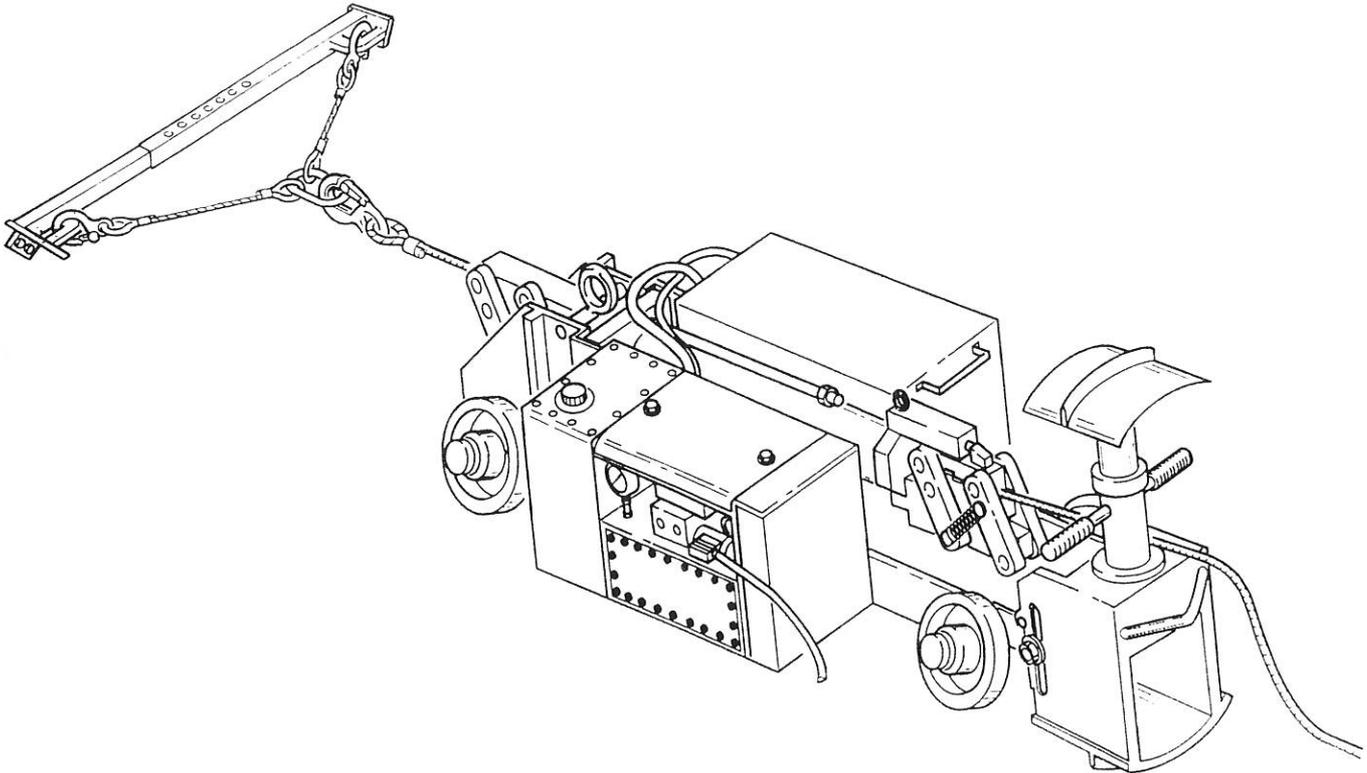




# Operating Manual KRINGS Maschinenbau KRINGS - Pipe Pulling Machine

Operation (Continued)

7/3



Fix pipe pulling machine with socket fixture (4) inside cleaned pipe. Run support of pipe pulling machine straight underneath socket of pipe just laid. Turn apart the spindle by using the handles until pipe pulling machine is properly fixed (4/3). Before the first pull, make sure that pipe car is actually fixed! Retighten socket fixture after first pull.

Connect steel pulling cable with pulling bar via load distributing harness. Place pulling bar horizontally into pipe. This way, the steel pulling cable is fed through the cylinder unit at the same height as the pulling bar. You need a helper for this job holding the pulling bar in this position until the cable is tensed for the first time. The load distributing harness



Remove control panel with control cable out of danger area of pipe pulling machine. The operation of the pipe pulling machine within the danger area of the pipe pulling machine is forbidden (7/5)!



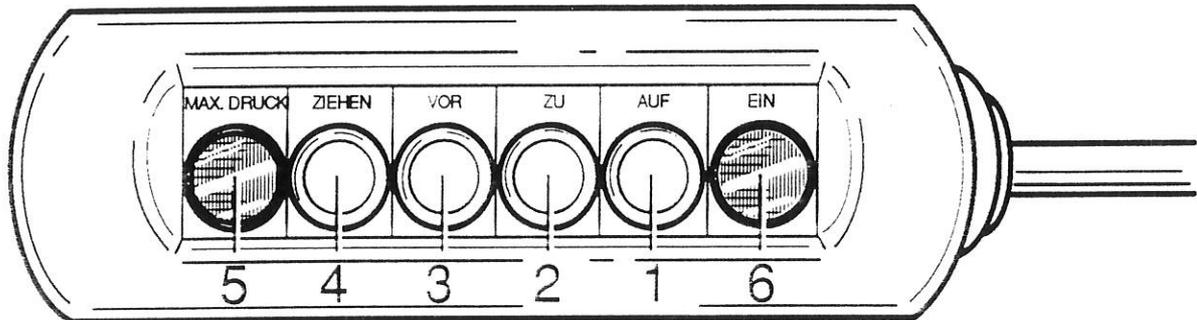
# Operating Manual

## KRINGS Maschinenbau

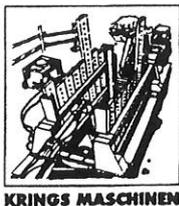
### KRINGS - Pipe Pulling Machine

Operation (Continued)

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- Press pushbutton "Auf" (1) on control panel to open up rear clamping jaw.
- Press pushbutton "Vor" (3) on control panel to move forward pull cylinder. Upon reaching its end position, the front clamping jaw opens up automatically.
- Insert steel pulling cable into both clamping jaws.
- Press pushbutton "Ziehen" (4) on control panel to activate pulling process. In case the stroke of 500 mm is not enough, the steel pulling cable must be gripped again. As soon as the signalling lamp "Ein" (6) comes up, the pulling process must be interrupted.
- Close rear clamping jaws by pressing pushbutton "Zu" (2).
- Press pushbutton "Vor" (3) to move forward pull cylinder. The front clamping jaw opens up automatically as soon as any load is released.



# Operating Manual

## KRINGS Maschinenbau

### KRINGS - Pipe Pulling Machine

#### Operation (Continued)

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- Press pushbutton "Ziehen" (4) on control panel to activate pulling process. After a short period of pulling, open up rear clamping jaw by pressing pushbutton "Auf" (1) on control panel.
- Repeat process described above until desired pull position is reached.
- Release load from steel pulling cable by pressing pushbutton "Vor" (3) on control panel at the end of pulling process.
- Use pushbuttons "Auf" (1) and "Vor" (3) on control panel to open up both clamping jaws.
- Loosen pulling bar. Repeat procedure for all other pipes accordingly.

#### Supervision



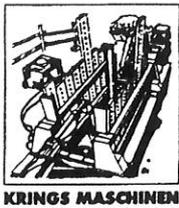
Make sure during pulling process that nobody is within the danger area of the tensed steel pulling cable as well as of any possible squeezing area within the range of the pipe being pulled.



Any pulling at angle is not allowed.



In case pulling process is interrupted without the signalling lamp "Max. Druck" (5) on, check battery for charge and replace or recharge, if necessary (6/2) (9/2).



# Operating Manual

## KRINGS Maschinenbau

### KRINGS - Pipe Pulling Machine

## FAULTS; REASONS AND TROUBLESHOOTING

8/1

### General Information

This section deals with faults occurring during operation and their possible reasons and the respective troubleshooting.



Any faults in electrical equipment and faults relating to mechanical and hydraulic devices not dealt with hereinafter, shall only be repaired by qualified personnel. Strictly follow the general regulations for the repair of faults stated in the UVV regulations.

During operation of the machine, the following faults may occur:

- The pipe pulling machine does not pull.
- The pipe pulling machine retracts from the pipe.

### Types of Faults

#### 1. The pipe pulling machine does not pull

a) Reason: Battery is not charged.

Consequence: The signalling lamp "Max. Druck" is not on.

Remedy: Charge battery or replace by charged battery.

b) Reason: Obstacle in pulling path.

Consequence: The signalling lamp "Max.Druck" is on.

Remedy: Remove obstacle.



# Operating Manual

## KRINGS Maschinenbau

### KRINGS - Pipe Pulling Machine

#### Types of Faults (Continued)

8/2

- c) Reason: Clamping jaws do not grip.

Consequence: The hydraulic cylinder retracts without pulling the steel pulling cable.

Remedy: Replace clamping jaws and check spring according to (9/4). If necessary, adjust screw of rear clamping jaw.

- d) Reason: Steel pulling cable is torn apart.

Consequence: Steel pulling cable is slack during pulling process.

Remedy: Replace steel pulling cable.

- e) Reason: Motor of hydraulic unit does not work.

Consequence: The pipe pulling machine does not pull. The signalling lamp "Max. Druck" on control panel is not on. The battery is charged and the electrical connections are o.k.

Remedy: Have motor checked through **Krings** technician or qualified staff member.

#### 2. The pipe pulling machine retracts from the pipe.

- a) Reason: The socket fixture is not properly fixed inside the pipe.

Consequence. The pipe pulling machine retracts from the pipe during the pulling process.

Remedy: Check again and fix pipe pulling machine inside pipe with socket fixture. Use respective extension pipe for adaption purposes. Retighten after the first pull (4/3).



# Operating Manual

## KRINGS Maschinenbau

### KRINGS - Pipe Pulling Machine

## MAINTENANCE AND SERVICING

9/1

### General Information

A careful maintenance and servicing of the pipe pulling machine guarantees a higher degree of readiness for operation as well as functional safety and increases the service life of the important parts and components.

This section stipulates working- and control procedures to be carried out by trained operating staff at the respective time intervals.

 Any maintenance- and servicing work must be carried out in accordance with legal regulations and provisions - such as Regulations for Accident Prevention, Regulations for Working Places, Regulations for the Handling of Dangerous Materials and Substances etc. - and through professional and trained staff or through service staff of the **Krings Maschinenbau GmbH**.

Regularly carry out the work specified in the following section at the intervals stipulated in order to ensure an optimum and trouble-free operation of the machine.

#### Note:



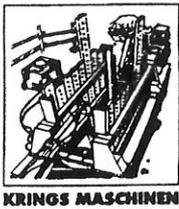
The time intervals may differ depending on the specific use of the machine, i.e. such intervals depend on the degree of utilisation of the machine and the related shift operation (one or more than one shifts).

In this connection, the DIN standards 31051, Part 1 "Maintenance; Definitions and Measures" are referred to.

#### Caution:



Only use genuine or equivalent spare parts approved by manufacturer when replacing parts or when procuring spares. Any nonfulfilment of this provision will render void the liability and performance guarantee (see pages 2/1-2).



# Operating Manual

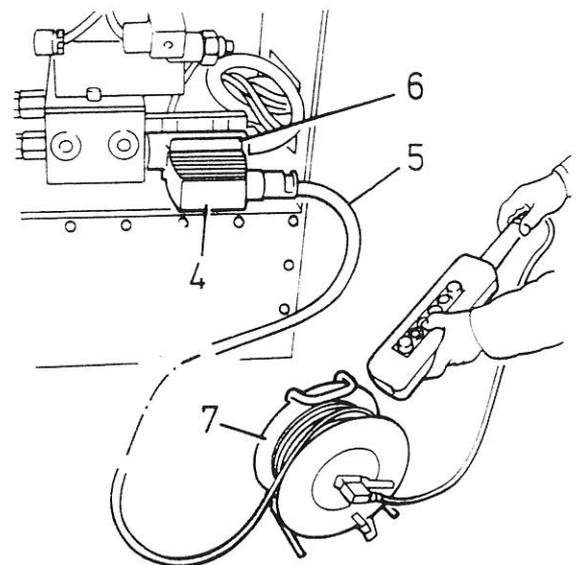
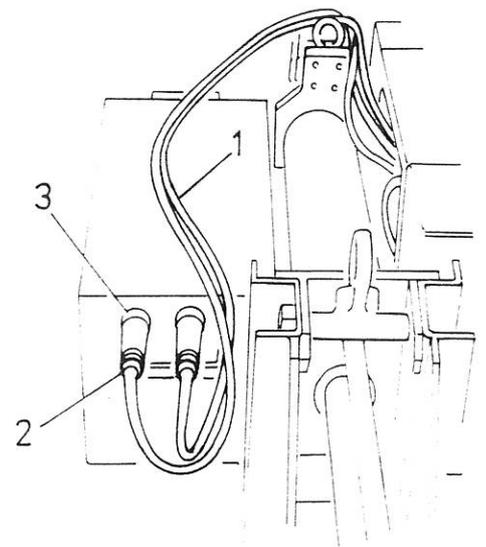
## KRINGS Maschinenbau

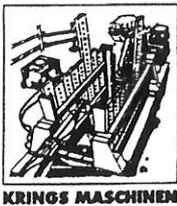
### KRINGS - Pipe Pulling Machine

#### Maintenance when Required

9/2

- Follow maintenance- and servicing instructions for battery. These are stated on the upper section of the battery in the power supply part.
- Check electrical contacts / plug connections. When connecting power supply cable (1) with reverse-protected plug connection (2)/(3) at power supply cable, check for damages, fitting and corrosion. If required, replace plugs / couplings.
- Check wiring for damages of insulation, brittling and squeezed sections and replace, if necessary.
- Check control cable (5) with connecting plug (4) and control panel for possible damages such as brittling, squeezed sections or cuts and replace if necessary.



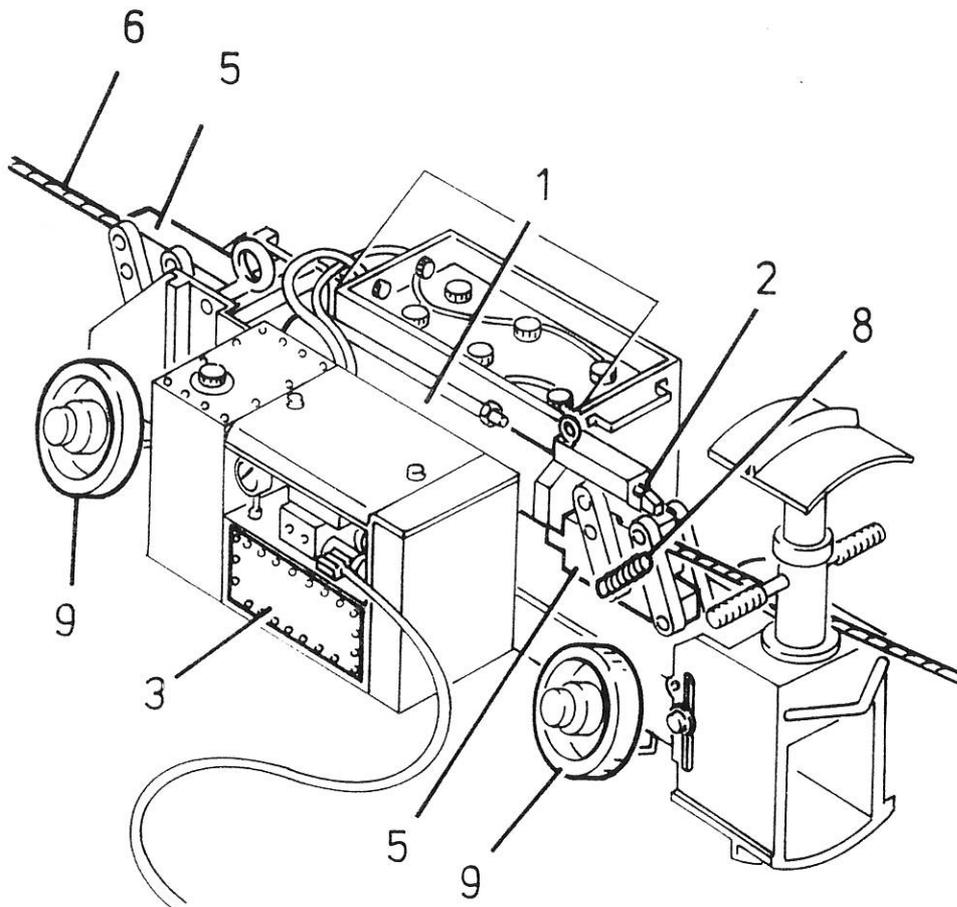


# Operating Manual KRINGS Maschinenbau KRINGS - Pipe Pulling Machine

## Maintenance when Required (Continued)

9/3

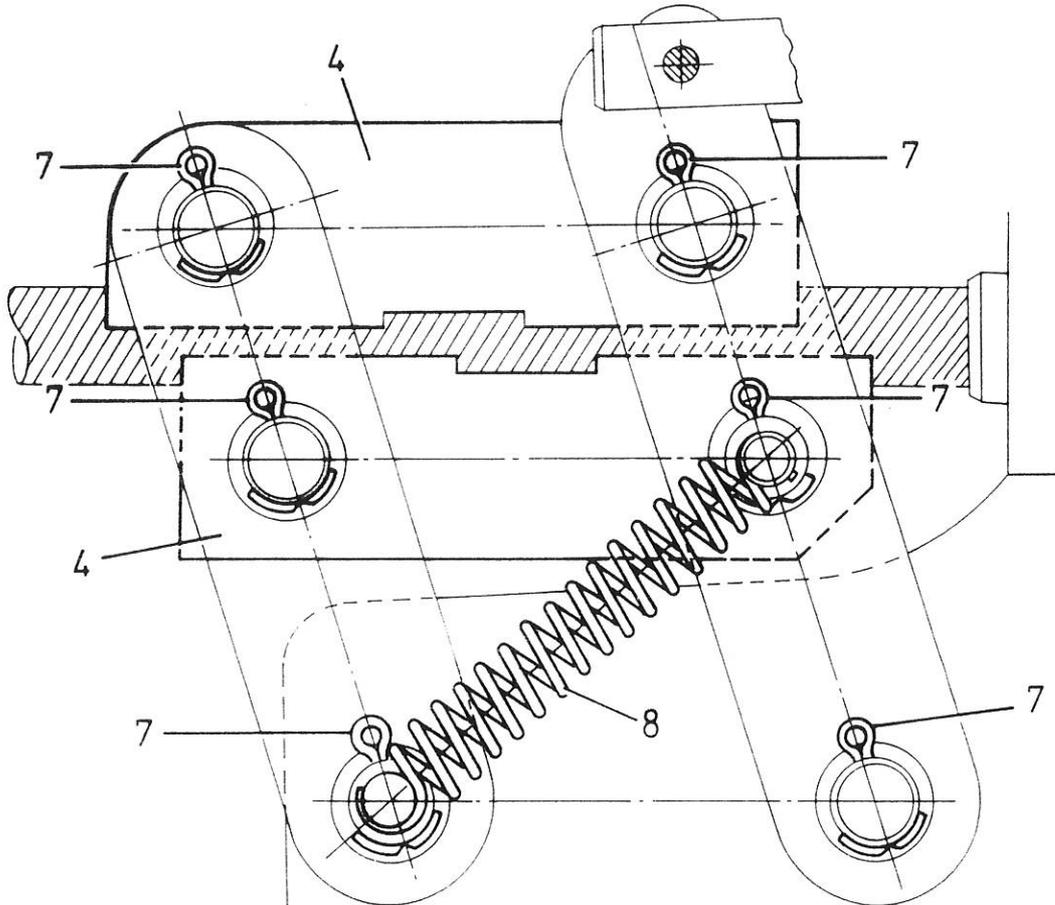
- Check hydraulic piping for leaks, damages of outer casing, bending and squeezed sections. In case of damage, have tubes replaced by qualified staff. If required, tighten screw connection with suitable spanner.



- Check pulling cable cylinder (1) and opening cylinder (2) for oil leaks. In case oil leaks from pulling cable or opening cylinder, shut down pipe pulling machine und have repair carried out through *Krings* technician or qualified staff.
- Check hydraulic pump housing (3) for mechanical damages and leaks. Check completeness and tight seat of screw cover at front side. Repair any defects you might notice. Check gasket of cover for proper seat and damages and replace if necessary.

#### Maintenance when Required (Continued)

9/4



- Check clamping jaws (4) of clamping grabs for wear. The steel pulling cable may slip in case of excessive wear of clamping jaws. Replace jaws in case of serious wear. Pull plugs of power supply cable out of sockets (9/2). Remove safety pins (7) and springs (8). Drive shafts of clamping grabs out of bore by using drift. Replace worn jaws by "Genuine Krings" spare parts. Assembly is carried out in reverse order of disassembly. Use roller bearing grease to lubricate shafts before assembly.
- Check springs (8) of clamping jaws (5) for proper function and replace if necessary..
- Check steel pulling cable (6) for wear. In case of serious wear or mechanical damage, replace steel pulling cable. Consider risk of cable rupture involved!



# Operating Manual

## KRINGS Maschinenbau

### KRINGS - Pipe Pulling Machine

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#### Maintenance when Required (Continued)

9/5

- Check running wheels (9) for smooth operation and damages. Replace through genuine spare parts in case of poor run or damages. If required, lubricate bearings with roller bearing grease.
  
- Check axles of running wheels for mechanical damages. In case of damages, have them repaired by qualified staff or "Klings" technicians.
  
- Check plastic-coated handles of toggles for damages. If required, replace PVC handles through genuine spare parts.
  
- Take appropriate measures to protect all of equipment against corrosion.



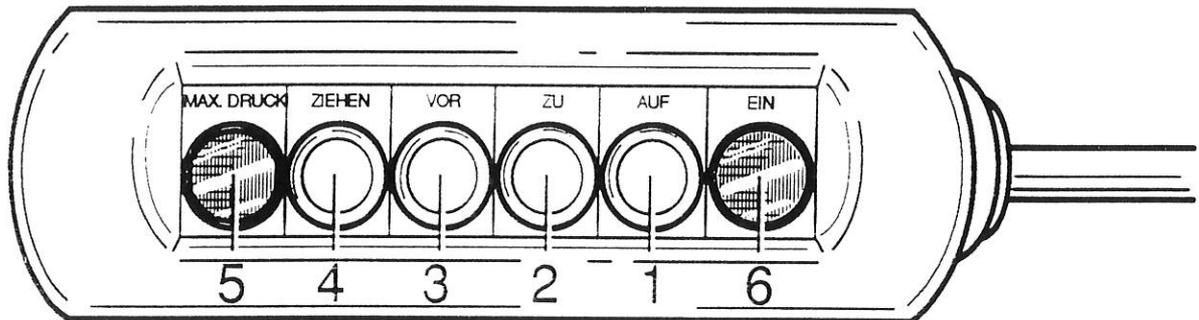
# Operating Manual

## KRINGS Maschinenbau

### KRINGS - Pipe Pulling Machine

#### Daily Maintenance

9/6



1. Visual- and functional control of all operating- and control elements
  - Signalling lamps. By pressing pushbutton "Vor" (3) on control panel. the pulling cylinder extends. When reaching its final stop position, the front clamping jaw opens up and the signalling lamp "Max. Druck" (5) illuminates yellow. By pressing the pushbutton "Ziehen" (4) on the control panel, the pulling cylinder retracts. At the time approx. 120 mm stroke is left during the pulling process, the signalling lamp "Ein" (6) comes up white. In case one of the signalling lamps does not come up, replace bulb of respective lamp. For this purpose, carefully screw off coloured protective cap of signalling lamp to get to defective bulb. Check bulb and replace if necessary. Check again for function after replacement of bulb.
  - Pushbuttons. The pushbuttons "Vor" and "Ziehen" have already been checked for proper function. By pressing pushbutton "Auf" (1) on control panel, the rear clamping jaw opens up. By pressing pushbutton "Zu" (2) on control panel, the rear clamping jaw closes again.



In case one of the functions described before is not carried out, have control panel checked or repaired through *Krings* technician or qualified staff.

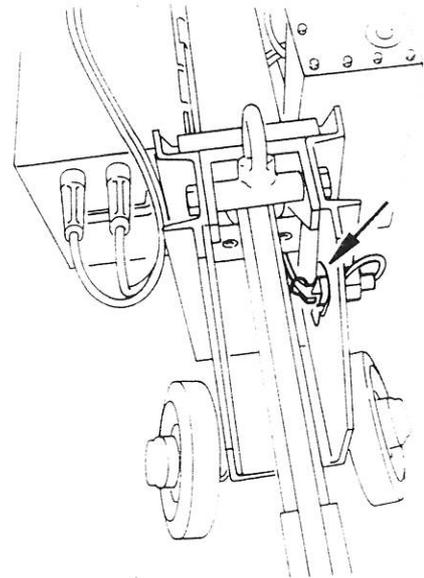


# Operating Manual KRINGS Maschinenbau KRINGS - Pipe Pulling Machine

## Daily Maintenance (Continued)

9/7

- Limit switch at cable pulling cylinder. At the time approx. 120 mm stroke is left, the signalling lamp "Ein" must come up. If not, replace bulb. If lamp does still not come up, have limit switch at cable pulling cylinder checked or repaired through *Krings* technician or qualified staff.

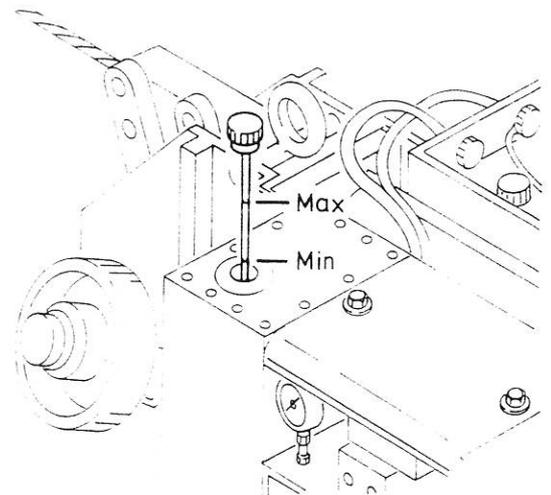


### 2. Power supply.

- Charge battery with the respective battery charger\*.

### 4. Hydraulics

- Check level of hydraulics oil with dip rod with pulling cylinder in retracted position. Oil level should be between the two marks (see figure). If required, fill ISO HLP-D 32/46 oil through bore usually holding dip rod.





# Operating Manual KRINGS Maschinenbau KRINGS - Pipe Pulling Machine

## Daily Maintenance (Continued)

9/8



Make sure pipe pulling machine is protected against flooding of water! Never allow pipe pulling machine to stay inside trench without supervision (such as overnight/weekends)! We expressly point out that the pipe pulling machine is only splash-proof (4/4)!

In case of a flooding of the trench, we recommend:

1. Recover pipe pulling machine from trench.
2. Do not start up pipe pulling machine!
3. Send pipe pulling machine to manufacturer for repair.





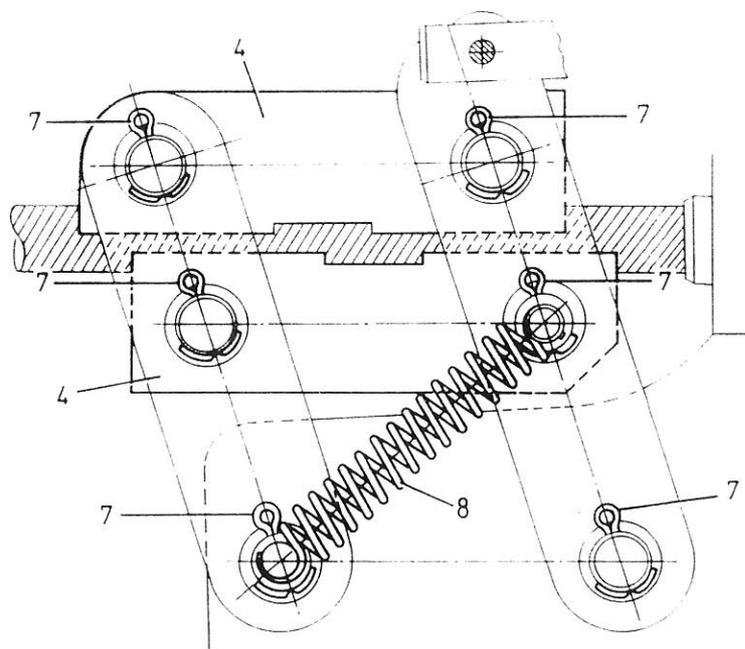
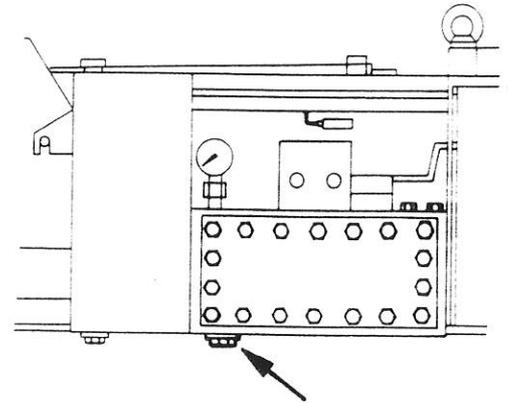
KRINGS MASCHINEN

# Operating Manual KRINGS Maschinenbau KRINGS - Pipe Pulling Machine

## Monthly Maintenance

9/9

- Check hydraulic pump housing for condensation water. For this purpose, remove drain screw (see figure, arrow). Completely drain any condensation water. Insert drain screw again.
- Lubricate spindle of socket fixture at lubricating nipple using a grease gun with graphite grease. Remove any excessive grease.
- Lubricate shafts of clamping jaws. Undo shafts as described (9/4). Lubricate shafts with roller bearing grease. Reinstall shafts as described (9/4) (see figure).
- Apply pole grease to battery poles.





# Operating Manual

## KRINGS Maschinenbau

### KRINGS - Pipe Pulling Machine

#### Annual Maintenance

9/10

- Change hydraulic oil. Remove magnetic oil drainage screw (see figure, arrow). Drain old hydraulic oil. Collect old oil drained and dispose of oil in accordance with applicable statutory regulations and provisions! Check magnetic oil drainage screw for metallic abrasion. In case of abrasion, have pipe pulling machine checked by *Krings* technician for possible damages. After inserting oil drainage screw again, fill up with new hydraulic oil ISO HLP-D 32/46 until fluid level is between the two marks on the dip rod.
- Clean suction filter or replace, if necessary. When changing hydraulic oil, replace suction filter in oil tank by new filter. For this purpose, screw off cover of oil tank to enable a lifting of the cover gasket of the suction filter at the beginning of the suction pipe. After replacement of filter, reassemble unit in reverse sequence of disassembly.

