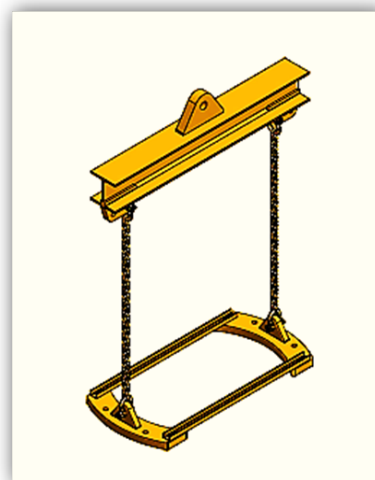
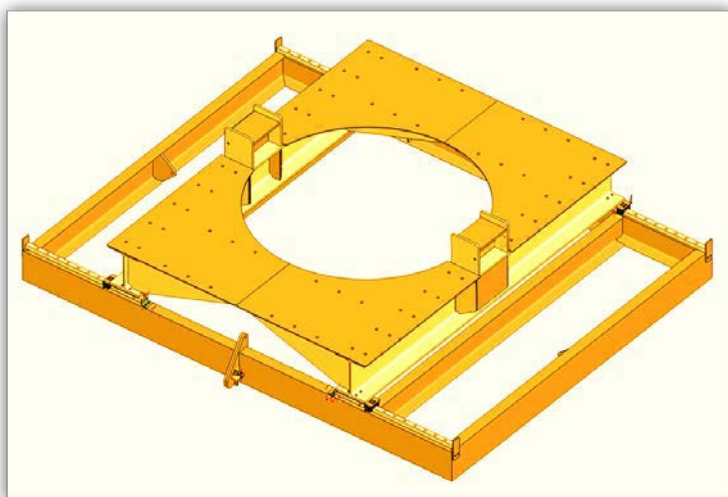


Operating instruction

no. 711644 / BA-1

Mounting clamp for tubular casing pump



Customer	KSB Service GmbH
Order no.	4504916179

Manufacturer	TSU Stahl-, Maschinen- und Anlagenbau GmbH
Fabrication no.	4444 / 3881-1, -2, -3-1 + -3-2, -4-1 + -4-2
Remark	

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List of revision

Rev.	Description	Page	Date	Name	Approval mark

Preface

Basic advice for the user of the operating instruction

The delivered mounting clamp of tubular casing pump, consist of one mounting device and one lifting device, will be named mounting device respectively lifting device in the following operating instruction.

Several pictures or drawings in this operating instruction are for identification and description of the mounting device / lifting device.

The right is reserved to make technical alterations and to supplement the operating instruction.

It is no permitted to forward or supplement this operating instruction unless express consent has been given to do so.

The date on which the operating instruction were issued

The date on which the operating instruction was issued corresponds to the date when they were drawn up that is given on the cover sheet.

Copyright

The copyright to this operating instruction remain with TSU GmbH. This operating instruction is only intended for the operator and his personal.

She contains regulations and advice that are not allowed to be either completely or partly:

- duplicated
- disseminated or
- notified in any other way

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Index

List of revision	2
Preface	3
1 Generally	6
1.1 Introduction to the operating instruction	6
1.2 Assistance of instruction and training	6
1.3 Warranty and liability	6
2 Advice about safety	7
2.1 Generally	7
2.2 Use as directed	7
2.3 Use not as directed	7
2.4 Explanation of the hazard symbols	8
2.5 Obligations of the operator and his personnel	9
3 Description of the mounting device / lifting device	10
3.1 Technical data	10
3.2 Scope of delivery of the mounting device / lifting device	11 -12
3.3 Mounting device / lifting device	12
4 Putting into operation	13
4.1 Conditions of erection	13
4.2 Conditions of use	13
4.3 Putting into operation / installation process	13 - 15
5 Handling and behaviour during operation	16
5.1 Attachment of loads and transport	16
6 General arrangement drawings	17
6.1 Mounting device assembly drawing no. 3881-0-0-00	17
6.2 Cross beam drawing no. 3881-3-0-00	18
6.3 Lifting device tubular casing pump / discharge elbow drawing no. 3881-4-0-00	19
6.4 Lifting device lantern drawing no. 3881-5-0-00	20
7 Test instruction according to DGUV Regulation 100-500	21
7.1 Test instruction	21

8 Maintenance and upkeep	21
8.1 Maintenance, upkeep and remedying the malfunctions	21
8.2 Upkeep and maintenance	21
8.2.1 Generally	21
8.2.2 Supervision and maintenance	22
8.2.3 Test	22
9 Operating elements	23
9.1 Not applicable	23
10 Transport	23
10.1 Advice and protective measures for transport	23
11 Standards, regulations and guidelines	23
12 Design and calculation	23
13 Cleaning, colouring	23
13.1 Cleaning	23
13.2 Colouring	23

1 Generally

1.1 Introduction to the operating instruction

The operator of the mounting device / lifting device is obligated to draw up a user's guide for the operating personnel, in order for them to be protected from the health hazards or the other hazards that affect technical safety. Apart from that, the operator is obligated to instruct the operating personnel about safe and proper operation, upkeep and skilled operation of the mounting device / lifting device.

The mounting device / lifting device have been constructed according to the latest standard of technological development and the recognized rules of technical safety.

The operator is obligated to adjust the mounting device / lifting device to comply with the latest safety provisions that are valid respectively.

1.2 Assistance of instruction and training

The operator is obligated to inform and train his operating personnel about all existing statutory provisions and accident prevention regulations plus all existing safety equipment at the mounting device / lifting device.

The operating personnel must understand and carefully attend to these instructions.

1.3 Warranty and liability

Warranty and liability claims of any personnel injury or material damage are excluded in one or more of the following causes

- not use as directed of the mounting device / lifting device
- improper installation, commissioning, handling and maintenance of the mounting device / lifting device
- operation of the mounting device / lifting device using faulty safety equipment or improper fixed or inoperative protection and safety devices
- Non-observance of this operating instruction about transport, storage, installation, commissioning, operation and maintenance of the mounting device / lifting device
- unauthorized constructional alterations of the mounting device / lifting device
- unauthorized modification of components, assembly groups or technical data (e.g. load capacity)
- insufficient monitoring of machine parts, which are subject to wear
- improperly executed repairs
- catastrophes caused by foreign objects or force majeure

2 Advice about safety

2.1 Generally

The following hazards can arise, even though the mounting advice / lifting advice has been constructed to the latest standard of technological development, if it:

- is not operated by trained or instructed personnel,
- is not used as directed,
- is not in a flawless or faultless condition according to technical safety,
- is improperly kept or maintained in good condition.

Malfunctions that can adversely affect the safety must be remedied immediately.

Knowledge of the safety instructions and the safety rules is a basic condition for the safe handling of the mounting device / lifting device.

The operating instructions and the specification of maintenance include the most important instructions for the safe operation of the mounting device / lifting device.

This operating instruction and the advice about safety in particular must be followed by all persons who work with the mounting advice / lifting advice.

In addition, the rules and regulations about preventing accidents that apply to the place of use must be complied with.

2.2 Use as directed

The mounting device / lifting device is used exclusively for the assembly or dismantling of tubular casing pumps. The maximum load capacity of 20 t of the mounting device, the cross beam, the lifting device for riser pipe and discharge elbow and 4 t of the lifting device for lantern must not be exceeded.

Every use other than for this purpose applies as use not as directed. The operator or user of the mounting device / lifting device is solely liable for any damages that arise as a result.



Important

The directed use also includes:

- observance of all directions of the operating instructions
- adherence to the inspection and maintenance work

2.3 Use not as directed









Every use of the mounting device / lifting device other than the use is described in Point 2.2 applies as use not as directed.

2.4 Explanation of the hazard symbols

Every commissioning, handling, maintenance and upkeep of the mounting device / lifting device must be determined only on the basis of the procedure instructions in this operating instruction.

Before commissioning the mounting device / lifting device read this operating instruction carefully. The safety instructions must be observed strictly!

Important advice, especially advice about technical safety, is identified by appropriate symbols (pictograms) and the meaning of them is described in the following text. Follow this advice in order to prevent or avoid hazardous situations from occurring that could result physical injury or damage to materials.

Symbol	Explanation	Symbol	Explanation
	Read the operating instructions before using		Advice for safe operation
	Important information		Hazard symbol or cautionary symbol
	Warning of risk of crushing		Warning of hand injury
	Warning of suspended load		Warning of obstacles in the head area

2.5 Obligations of the operator / operating personnel

Operator of the mounting device / lifting device

The operator obligates that only personnel operates the mounting device / lifting device who ...

- are familiar with the basic regulations about occupational and industrial safety as well as those about preventing accidents, and also instructed of handling the mounting device / lifting device,
- have read the chapter about safety and the warning advice that is given in the operating instruction and confirmed that by their signature.

The operator obligates additionally that

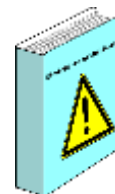
- the operating personnel will be tested regularly if they work according to the safety instructions
- the operating instruction is permanently available at the place where the mounting device / lifting device is in use
- all of the advice about safety and hazards are permanently available at the place where the mounting device / lifting device is in use
- no significant changes of the mounting device / lifting device without authorization of the manufacturer
- any changes of the mounting device / lifting device must be verified with a new risk analysis and also be checked if the changes are significant
- any changes must be authorized by the manufacturer
- any parts of unit that are not in perfect condition must be exchanged immediately only with original parts
- any specified maintenance and inspections tasks must be carried out in a timely manner.



Personnel for operating and maintaining the mounting device / lifting device

Before starting work all personnel who will handle and operate the mounting device / lifting device obligates to

- pay attention to the basic regulations of labor protection and accident prevention
- read the safety chapter and the warning notes of this operating instruction and to confirm having read and understood them with their signature
- check the safety devices for function
- check the mounting device / lifting device for apparent damages.



3 Description of the mounting device / lifting device

3.1 Technical data

Mounting device:

- Maximum load-bearing capacity: 20 metric tons
- Length/width/height: 4000 mm x 3310 mm x 1060 mm
- Dead weight: 2,8 metric tons
- Fabrication no.: 4444 / 3881-1
- Year of manufacture: 2019

Cross beam:

- Maximum load-bearing capacity: 20 metric tons
- Length/width/height: 1875 mm x 430 mm x 736 mm
- Dead weight: 0,33 metric tons
- Fabrication no.: 4444 / 3881-2
- Year of manufacture: 2019

Lifting device for riser pipe and discharge elbow:

- Maximum load-bearing capacity: 20 metric tons
- Length/width/height: 1780 mm x 961 mm x 197 mm
- Dead weight: 0,2 metric tons
- Fabrication no.: 4444 / 3881-3
- Year of manufacture: 2019

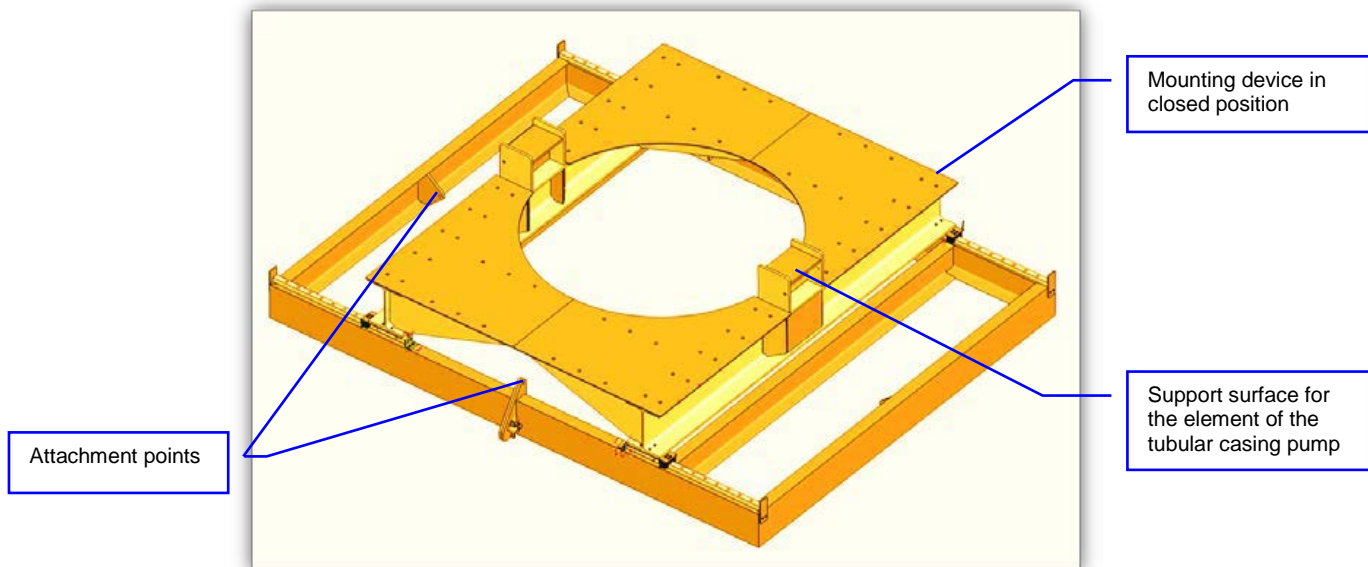
Lifting device for lantern:

- Maximum load-bearing capacity: 4 metric tons
- Length/width/height: 1360 mm x 600 mm x 106 mm
- Dead weight: 0,1 metric tons
- Fabrication no.: 4444 / 3881-4
- Year of manufacture: 2019

3.2 Scope of delivery of the mounting device / lifting device

1. Mounting device assembly drawing no. 3881-0-0-00:

- 1 piece underframe consisting of two parts connected with each other via a plug connection
- 1 piece slide, two-piece, movable on the underframe
- 1 piece positioning unit consisting of profile rails, guide carriage and clamping element



Secured plug connection

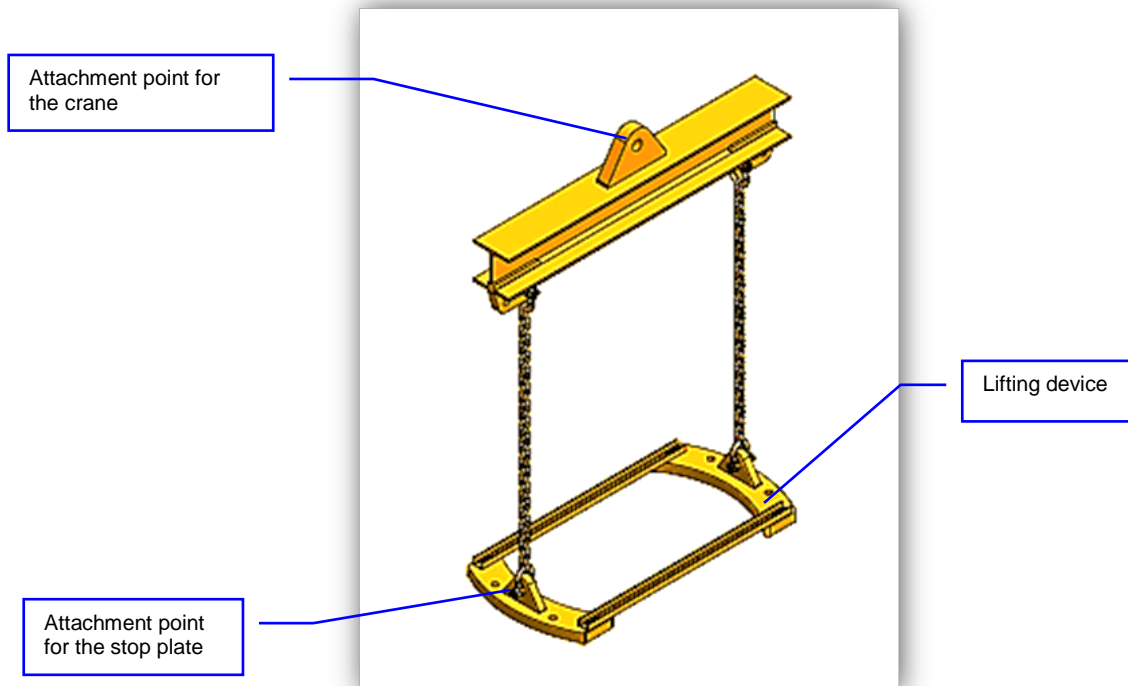
Clamping element

Guide carriage

Profil rail

2. Lifting device consisting of:

- 1 piece cross beam drawing no. 3881-3-0-00
- 1 pieces lifting device tubular casing pump / discharge elbow drawing no. 3881-4-0-00
- 1 pieces lifting device lantern drawing no. 3881-5-0-00



3.3 Mounting device / lifting device

As defined by the DGUV Regulation 100-500, the mounting/lifting device is a load handling attachment (fastener) between the crane and the load.

The elements of the multi-stage tubular casing pump are attached at a crane suitable for this purpose by using the lifting beam included in the delivery and the appropriate stop plates (lifting device), which are marked accordingly.

Due to the interaction of the mounting device and lifting device, the single elements of the multi-stage tubular casing pump are brought into the position intended for assembly.

First of all, the preassembled mounting device is attached to a crane, which is designed for the load to be picked up and is driven to the place of assembly and set down.

Subsequently, the lifting beam is attached to a crane, which is designed for the load to be picked up. The stop plates are attached to the lifting beam then. Like this the corresponding set of stop plates can then be put on the top flange of the tubular casing pump, screwed firmly, be moved with the crane and be set down on the mounting device.

The screws used for this purpose must be at least of Grade 8.8.

See also point 4.3 Putting into operation / installation procedure.

The mounting device / lifting device may only be picked up by **tested** power driven lifting gears (crane), which are designed according to the load to be picked up.

The component to be mounted or dismounted, respectively, is moved into the correct position above the undercarriage with its running gear. Here, the guide carriages mounted at the undercarriage enable moving on the profile rails of the rail substructure. The desired position is kept by locking the clamping device manually.

4 Putting into operation

4.1 Conditions of erection

The mounting device / lifting device has to be checked for completeness, operativeness and damage before each use!

A damaged mounting device / lifting device, in particular in case of damage such as:

Notches and strong wear and tear, bent component parts, lasting deformation at the mounting device / lifting device, absence of the manufacturer's plate with specification of the load-bearing capacity, illegible or missing marking, may not be used any longer. May only be operated by commissioned and instructed persons in accordance with the provisions of the DGUV Regulation 100-500.

The type plate indicates the load-bearing capacity of the mounting device / lifting device.

4.2 Conditions of use

As a matter of principle the load handling attachment must not be used, deposited or stored outdoors at -20°C.



The load handling attachment may be damaged.

The material of the load handling attachment may embrittle or break under load when operating and storing the load handling attachment at temperatures below -20°C.

Make sure that the load handling attachment is always used and stored at temperatures above -20°C.

4.3 Putting into operation / installation process

Preparatory assembly work at the mounting device

1. One slide half is placed on the profile rails on one part of the underframe of the mounting device, respectively, and mounted firmly.
2. These mounted slide halves are manually brought into a position, which guarantees that the three attachment points of the slide half are freely accessible and are secured by fixing the clamping elements behind the guide carriage.

Installation process

1. Attachment of a preassembled half of the mounting device to a crane.
2. Moving and setting down of the first half of the mounting device above the opening intended for insertion of the multi-stage tubular casing pumps.
3. Moving and setting down of the second half of the mounting device vis-à-vis the first half of the mounting device in such a manner that these can be firmly connected with each other via the plug connection and secured by a wedge (see pictures).





4. Loosen the clamping elements and open the slide halves manually up to the limit stop. Subsequently, secure the slide halves in this position by fixing the clamping elements.
5. Attachment to a crane.
6. Now attach the stop plates with the fabrication no. 4444 / 3881-3-1 and 3881-3-2 at the cross beam, move above the lowermost element of the tubular casing pump, set down on the top flange and align in such a manner that these may be firmly screwed together with the tubular casing pump element.



7. Move the pump element in center above the opened mounting device and lower it into the opening to such an extent only that the pump element cannot yet bear on the support surfaces of a closed mounting device.
8. Loosen the clamping elements at the mounting device and close the slide halves manually. Secure the position by fixing the clamping elements.
9. Lower the pump element on the support surfaces of the mounting device and release the stop plates.
10. Attachment of the stop plates at the top flange of the next tubular casing pump element as described before.
11. Screw the two pump elements together. **It is absolutely necessary to make sure that the crane still holds the upper pump element.**
12. After the two pump elements have been firmly connected with each other, these are lifted that much until the lower pump element does not bear on the support surface of the mounting device any longer.
13. Loosen the clamping elements of the mounting device again and open the slide halves up to the most outer limit stop and secure by fixing the clamping elements.

14. Now lower the pump unit developed that way further into the opening. But again only to such an extent that the upper pump element cannot yet bear on the support surfaces of the closed mounting device.
15. Loosen the clamping elements at the mounting device and close the slide halves manually. Secure the position by fixing the clamping elements.
16. Set down the pump unit on the support surfaces of the mounting device and release the stop plates. Repeat this process until all ascending pipe elements of the tubular casing pump and the discharge elbow are mounted in this manner and the last ascending pipe element is situated in the mounting device.
17. After the last two pump elements, ascending pipe element and discharge elbow, have been firmly connected with each other, these are lifted that much until the lower pump element does not bear on the support surface of the mounting device any longer.
18. Loosen the clamping elements of the mounting device again and open the slide halves to the most outer limit stop and secure by fixing the clamping elements.
19. Now it is **absolutely necessary to loosen** the plug connection of the mounting device! Subsequently remove the mounting device, which is now two-part again from the area of the tubular casing pump mounted so far, e.g. with a jack/hoist.
20. The pump line mounted so far can now be approached up to the pump foundation.
21. Release the stop plates from the top flange of the discharge elbow.
22. Change of the stop plates. In order to be able to take up the lantern, it is now necessary to attach the stop plates with the fabrication no. 4444 / 3881-4-1 and 3881-4-2 at the cross beam.
23. Attachment of the stop plates at the top flange of the lantern as described before.
24. Move the lantern and set down on the discharge elbow.
25. Screw the two pump elements together. **It is absolutely necessary to make sure that the crane still holds the lantern.**
26. Finally release the stop plates from the top flange of the lantern.

General safety instructions



Risk of accident due to insufficient securing at the crane!

The mounting device/ lifting device may fall down if it is not secured at the connecting element or at the crane. This may cause death or severe injury.

Make sure that the mounting device / lifting device is always secured!



Risk of accident through crushing during the commissioning tests!

Driving the crane imprudently may cause uncontrollable oscillating motions of the load. This implies a considerable hazard to persons and material goods in the surroundings.

Make sure that the crane is driven by trained staff with due diligence!

5 Handling and behavior during operation

5.1 Attachment of loads and transport

Any transport of liquid bulk and bulk materials as well as the use outside the temperature range of -20°C to +100°C is not allowed.

The load that shall be lifted with the mounting device / lifting device must be dimensionally and inherently stable. It has to be picked up in its center of gravity.



Attention: It is prohibited

- to attach loads at existing load servings such as binding wires or binding bands and to lift them!
- to attach the load symmetrically as this involves the risk that the load will hang crookedly and the applied slings may be loaded to a different extent!

Make sure that all slings are loaded evenly! (Same length, possibly work with shortener)

The operator has to employ suitable slings, which match the purpose of application.

Damaged slings may not be used.

Hooks may not be loaded at the tip; oval rings must be freely movable in the hook.

All movable slings and attachment points must be fastened at the lifting beam in such a manner that they may not disengage, shift or fall down during the transport!

Any diagonal pull is prohibited! Do not tear off any load, no tilting stroke during turning loads. When moving loads with lifting beams, it has to be ensured that the load may not jolt somewhere or oscillates!

When attaching the load in the basket hitch, it is essential to protect or avoid sharp edges at the loads. Slings may not shift or displace in the basket hitch.

The corresponding reduction of the load-bearing capacity is to be taken into consideration depending on the angle of inclination of the applied slings.

When using the choke hitch, the load-bearing capacity still only amounts to 80%.



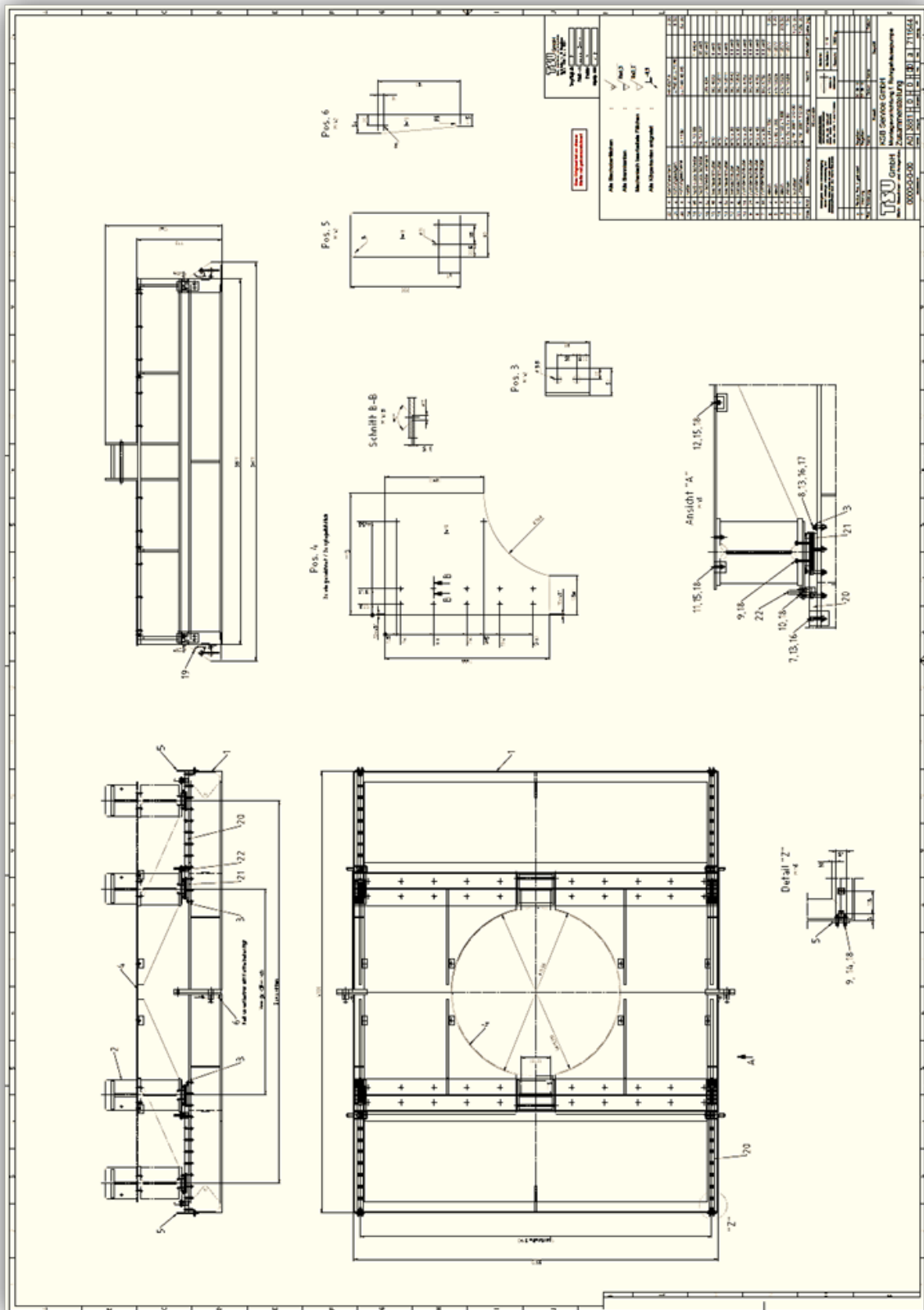
Transport and storage

Due to the size and weight of the mounting device / lifting device, it may only be transported with vehicles, which are suitable and approved for this purpose. It is imperative to ensure sufficient securing during the transport.

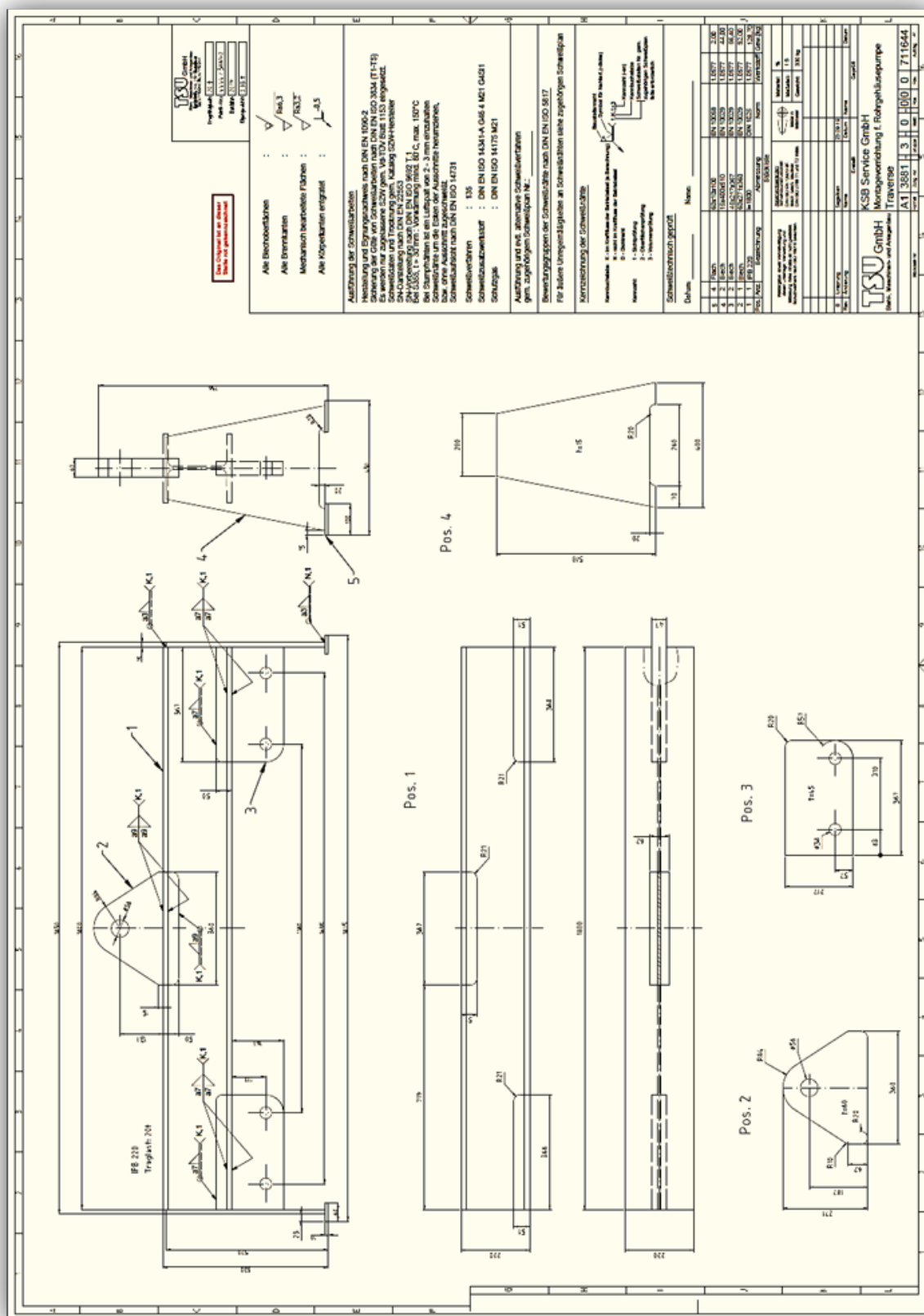
The mounting device / lifting device may only be stored in areas designated by the operator. These should be weather-proof under a roof.

6 General arrangement drawing

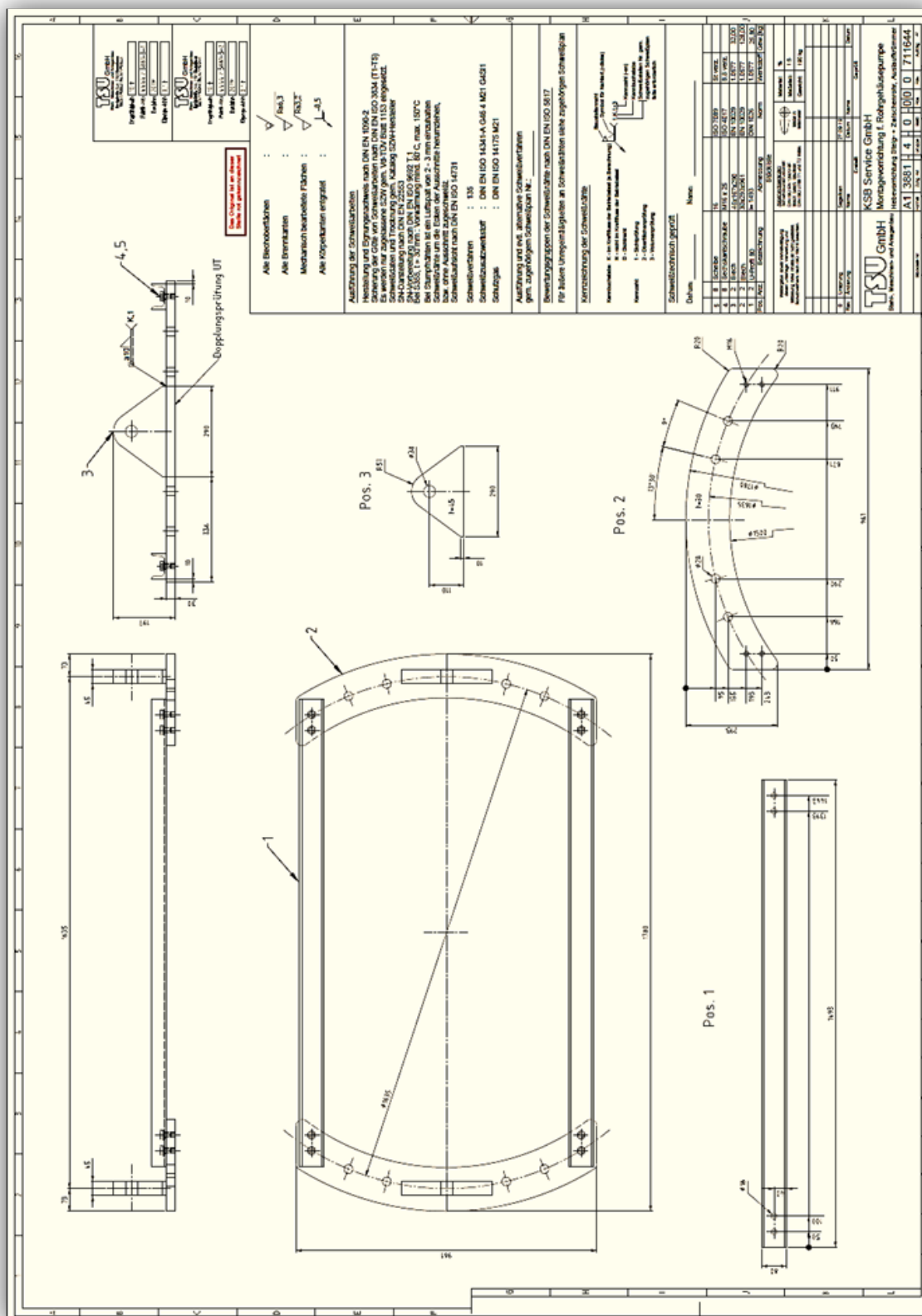
6.1 Mounting device assembly drawing no. 3881-0-0-00



6.2 Cross beam drawing no. 3881-3-0-00



6.2 Lifting device tubular casing pump / discharge elbow drawing no. 3881-4-0-00



7 Test instruction according to DGUV Regulation 100 - 500

7.1 Test instruction

Before commissioning, and then at regular intervals the mounting device / lifting device must be verified by a "technical expert" according to BetrSichV (BetrSichV= German Industrial Safety Regulation).

Periodic inspections must be initiated by the operator. These inspections must be executed by a "technical expert"

„Technical experts“ are persons who, in view of his or her expert training and experience, has sufficient knowledge in the field of load attachment and who is familiar with the current and valid German Industrial Safety Regulation to the extent that he or she can evaluate the safety working conditions and correct application of personal safety equipment (e.g. VDI, DIN, BetrSichV).

1. Visual inspection

Check the mounting device / lifting device visually for damages.

Check all accessories for visual damages. Replace if necessary.



Advice

*Do only use original spare parts / wear parts / accessories.
When using parts supplied by third parties, it is not guaranteed that they are constructed and manufactured according to operational demands and safety requirements.*

2. Testing under load before the first commissioning

The testing must be documented in the test log after it has been completed.

3. Repetitive testing

The mounting device / lifting device must be verified once a year from a „technical expert“.

4. Testing after important alterations

The mounting device / lifting device must be subjected to an external inspection by an expert after essential alterations have been made or after the operating conditions have been altered.

8 Maintenance and upkeep

8.1 Maintenance, upkeep and remedying the malfunctions

All the work of maintenance and inspection that is prescribed in the operating instructions must be done on time.

Inform the operating personnel before maintenance and inspection.

Check the safety equipment after maintenance and inspection for proper operation.

8.2 Upkeep and maintenance

8.2.1 Generally

All results of the tests and inspections as well as the measures that have been taken must be recorded in writing!

All upkeep and maintenance operations are to ensure correct and safe functioning of the equipment.

The work may only be carried out by instructed personnel.

As far as possible, the work should be carried out while the equipment is not under load.

8.2.2 Supervision and maintenance

The quoted intervals of supervision and maintenance apply to normal conditions and single-shift operation. The intervals must be shortened appropriately in the case of more difficult conditions of use (e.g., frequent operation und full load) or particular ambient conditions (e.g., heat, dust, etc.).

Defects in paint work have to be repaired to avoid corrosion.

All articulation points and sliding surfaces have to be lubricated slightly.

Clean the mounting device / lifting device in case of strong dirt accumulation.

Table showing the intervals of inspections

	Before each use	After each use	Once monthly	1st maintenance after 3 month	Testing and maintenance every 3 months	Testing and maintenance every 12 months	Entry in the test record
Check mounting / lifting device for damage and wear (Visual inspection)	X						
Cleaning of the profile rails	X	X					
Lubrication of the guide carriage (lubricating nipples)		X					
Check mounting / lifting device by a technical expert (periodic inspection)						X	X



8.2.3 Testing

The mounting device / lifting device must be visually inspected for deformations, cracks and corrosion during the prescribed, annual, repetitive tests.

Attention!

The parts must be replaced with original spare parts in the case that the permissible size is not reached or exceeded respectively, or if cracks or corrosion are established!

9 Operating elements

9.1 Operating elements

Not applicable.

10 Transport

10.1 Advice and protective measures for the transport

The mounting device / lifting device assemblies are assembled completely and then tested by the manufacturer on his premises.

Any parts that could loosen during the transport must be removed or protected beforehand.

11 Standards, regulations and guidelines

The following standards, regulations and guidelines apply:

The standard for load handling attachment (DIN EN 13155), the other applicable DIN standards and guidelines issued by the German Society of Engineers (VDI), as well as the accident prevention regulations of the German Employers Liability Insurance Associations (DGUV Regulation 100-500).

12 Design and calculation

All parts of the mounting device / lifting device correspond to the latest standard of technological development at the point in time when the planning is done. The calculation and construction correspond to the standards specified in the test record.

All of the materials and components that are used have been qualitatively checked, operationally proven and inspected for suitability.

13 Cleaning and colouring

13.1 Cleaning



Fire hazard

When cleaning the mounting device / lifting device, please observe the following:

Fire, naked flames and smoking are forbidden!



Properly handle and dispose of the substances and materials that are used, especially:

- when working on the lubricating systems and devices
- when cleaning using solvents.

13.2 Colouring

The mounting device / lifting device are coated with RAL 1023.