KESLA

TIMBER HANDLING CRANE

2012
2012T

USER MANUAL
MAINTENANCE
SPARE PARTS

(a translation from the original version)
KESLA 2012 GB 2018 07

EC DECLARATION OF CONFORMITY FOR MACHINERY

Manufacturer: *Kesla Oyj*
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Herewith we declare that

Timber handling crane KESLA 2012, 2012T

Serial number:_____

- *is in conformity with the relevant provisions of the Machinery Directive (2006/42/EC)*
- *is in conformity with the provisions of the following other EC-Directives*

  2014/30/EC

And furthermore, we declare that

- *the following (parts/clauses of) European harmonised standards have been used*

  SFS-EN ISO 12100
  SFS-EN-12999

Place, time: Joensuu 7/17/2018

Signature: _____
Managing Director Simo Saastamoinen

(a translation from the original version)

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DEAR CUSTOMER,

Thank you for choosing a KESLA product and we wish you success in your work. We ask you to carefully read this manual as good knowledge of the machine's operation and meticulous management result in the best occupational safety conditions and the machine's productivity from day to day. It is important that you have understood and complied with every section of this book. In case of doubt please contact your dealer. You can also provide feedback to Kesla using the feedback form at the end of this manual or at www.kesla.fi.

1 INTRODUCTION

1. *Read the instructions first. A prerequisite of the crane's use is a good understanding of its safety and operating instructions.*
2. *Check the basic unit's compatibility with regard to hydraulics and standing stability.*
3. *Follow the installation instructions and, if necessary, ask more information from your dealer or from the factory.*
4. *Carry out legally required inspections.*
5. *Practice makes perfect.*
6. *Always work with caution.*
7. *Make a slow full-scale operating movement back and forth with all the loader's cylinders to make the gaskets more flexible.*
8. *Grease often and only a little bit rather than rarely and a lot.*
9. *Cleanliness is the most important thing in hydraulic systems.*
10. *Pre-loading oil: TEBOIL ECO 46*
11. *Repair even small defects before they can cause more serious damage.*

1.1 GENERAL INFORMATION

This is a machine-specific instruction manual for the KESLA crane to be supplied with the crane.

This manual is intended for persons who have previous experience with the use of timber cranes.

Please read and understand the operation, maintenance, and safety instructions before operating or servicing the crane. Operation, maintenance and adjustment may only be carried out by people qualified for operating and servicing the specified device. Lack of information on the device's operation and characteristics can cause serious injury or death.

1.1.1 Storing the manual

This manual is an essential part of the product and must be maintained intact throughout the product's service life. If any changes are made to the crane, they should be added to this manual. Keep your manual clean and easily accessible. If the crane is sold, the manual must be handed over to the new owner.

1.1.2 Manual contents

The operating instructions contain the following information:

- *General information about the manual's purpose and content, instructions on how to read the manual, as well as a request to provide feedback and report any possible errors.*
- *Safety instructions*
- *Daily inspections*
- *Operating instructions*

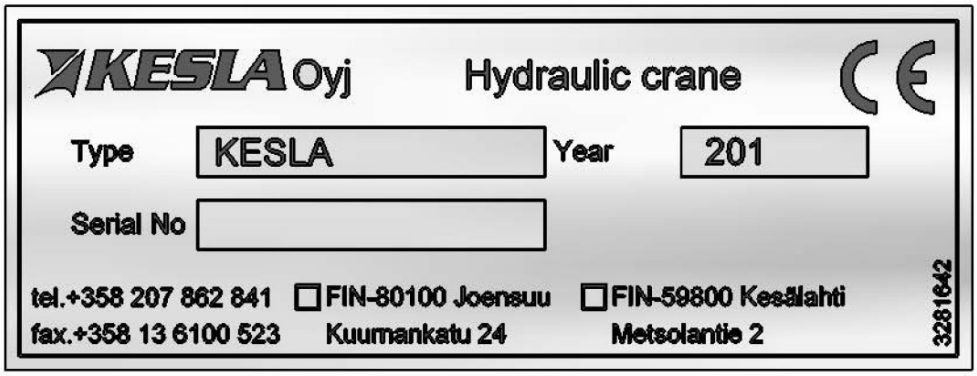
- All descriptions, instructions and specifications in this manual are based on the latest information about the machine's structure on the date the manual was printed. The product is being continuously developed and, therefore, the manufacturer reserves the right to change product specifications without prior notice.

- If machine malfunctions occur, the problem and its probable cause can be clarified and corrected on the basis of the table. If you are unable to repair the machine yourself, please contact your dealer or a service workshop authorized by the dealer.

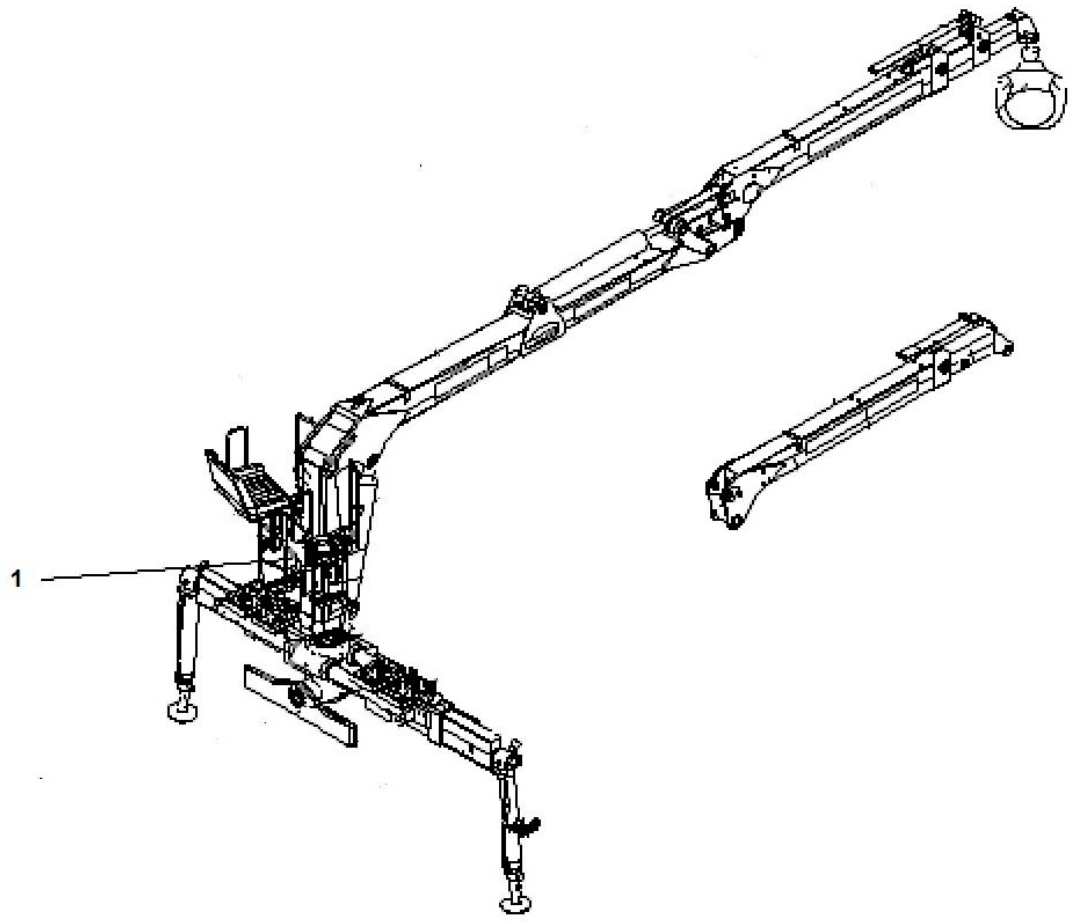
1.2 MACHINE PLATE

When ordering spare parts or requesting repair instructions, communicate to your dealer or repairman the information on the machine plate. This procedure will speed up getting help in case of malfunction or ensure that you receive the correct parts as fast as possible.

Write the machine plate information to the machine plate's image below.



Machine plate location:



1.3 PURPOSE OF THE CRANE

KESLA timber handling crane is designed for timber loading in contracting work. The crane is also suitable for loading scrap, sand, fertilizer, etc. when grapples fit for purpose are being used. Using the crane for lifting persons is prohibited!

1.4 RECOMMENDED OPERATING CONDITIONS

** If work is carried out at low temperature, let oil circulate for a while through the valve system with a low flow. Then slowly perform all the operating movements, back and forth, in order to make the gaskets more flexible before they receive maximum pressure.* ***The crane's lowest recommended operating temperature is - 25°C.***

** It should be noted that in lower temperatures hydraulic gaskets wear faster and the probability that hoses and steel structures become more susceptible and steel structure's probability of brittle fracture increases. When working in temperatures below - 25°C, it is preferable to lift smaller than normal loads in order to avoid unnecessary damage.*

** Similarly, in very warm conditions one should ensure that the hydraulic oil does not overheat (<75°C). A too high oil temperature may cause damage to the gaskets and it also reduces oil life.*

1.5 PROHIBITED USAGE AND CONDITIONS OF USE

The KESLA crane is designed for timber loading and it can be used only by a person familiar with its use.

It is forbidden to use the crane without having studied its use and safety instructions!

DANGER	
	RISK OF FALLING • ***Using the crane for lifting of persons is prohibited!***

- **Operation with hooks is not allowed!**

- **Use of the crane for towing is prohibited!**

CAUTION	
	• **Using a crane for compacting the loaded trailer and using a grapple as a hammer to level out stacks of wood is forbidden!**

CAUTION	
	• **Any use of a damaged or defective crane is prohibited!**

1.6 GENERAL WARRANTY TERMS FOR KESLA PRODUCTS

Kesla Oyj guarantees that the products they sell are free of defects and provides the following warranty for any problems that might appear in workmanship or materials:

1. *The warranty period is valid starting from the day the product is installed and covers only new products sold to their first owner.*

    - *For truck- and stationary installed loaders the warranty period is 2000 working hours or 12 months. The main components of the timber loader frame structure such as the boom, stabilizers and slew mechanism are warranted for 24 months from the date of delivery from factory.*
    - *For forest machine cranes and harvester heads the warranty period is 2000 working hours or 12 months.*
    - *For chippers the warranty period is 1000 working hours or 12 months.*
    - *For tractor-mounted timber trailers and loaders the warranty period is 12 months from the date of delivery to the customer. However, the warranty is valid max. 18 months from the date of delivery from the Kesla factory.*
    - *For spare parts the warranty period is 6 months from the date of purchase.*
    - *Kesla shall supply spare parts, produced by Kesla, for a period of ten (10) years, after the manufacturing of the Product has been stopped.*
    - *Warranty will be void when either working hours or calendar time of warranty period is filled.*

2. *Repair work under warranty is done during normal business hours only by Kesla Oyj factory authorized repair workshops or by Kesla Oyj authorized service repairman working according to their standard working schedule.*

3. *Kesla Oyj reserves the right to approve and authorize any part or work claimed under warranty.*

4. *The warranty stipulates that crane installation registration records to be properly filled out and returned to Kesla Oyj within 30 days of installation. The registration record contains the assurance that the new owner/user has been familiarized with the instruction manual.*

In order for the warranty to be valid the bill of delivery for loaders/trailers and the initial registration documents for harvester heads must be returned to Kesla Oyj. Furthermore the warranty requires first service to be carried out on cranes within 30 days of initial active use.

5. *Reimbursement applications for repair work must be filled out by the buyer or the authorized service repair workshop and returned to Kesla Oyj within 30 days from the date of damage. Damaged parts should be marked with both the customer's and machinery's information and may be requested to be returned to Kesla Oyj for inspection. Kesla Oyj will bear the cost of normal shipping charges for the returned parts if the matter has been agreed on in advance with Keslas warranty handling personnel. The warranty period for the exchanged part is valid to the end of the original warranty of the machine.*

6. *In case the warranty demand concerns a faulty part that has been taken apart from a Kesla product, it can be replaced with a similar functioning part free of charge by Kesla Oyj spare parts warehouse, at an authorized service workshop or by Kesla Oyj authorized service repairmen. The warranty covers defects arising in raw material, structure or manufacturing. The defected part will be replaced with a new or reconditioned part from Kesla Oyj.*

7. *The warranty does not cover parts which normally wear out and need to be regularly replaced such as filters, oil, hoses, gaskets, belts, skid bearings and glide pads or any similar.*

8. *The warranty does not cover faults resulting from:*

    - *Non-compliance with proper use and/or safety issues as mentioned in the product manual*
    - *Improper or non-sufficient installment or service*
    - *Normal wear and tear*
    - *Accidents*
    - *Overloading*
    - *Impurities in oil or in hydraulic system*

9. *The customer bears financial responsibility for costs arising from fulfilling warranty requirements such as travel and accommodation costs for repair personnel, fees for transporting equipment or components, overtime or other similar costs.*

10. *If machinery breaks down, Kesla Oyj bears no responsibility for damages caused by machinery to property or persons. Furthermore, Kesla Oyj bears no responsibility for financial loss occurring in down time (for example, losses arising from wages or transportation fees).*

11. *Attachments or components supplied to Kesla Oyj by sub-contractors are quaranteed only according to the warranty terms given by the supplier.*

12. *The warranty will be considered either patially or entirely invalidated if repair or maintenance carried out by the owner/user are done improperly, if unsuitable, non-compatible or foreign parts are installed, if modifications or changes to the product or hydraulic equipment are made without the a written permission of Kesla Oyj or if hydraulic system is adjusted exceeding allowed tolerances or reference values.*

13. *In addition to the above mentioned terms there may be more detailed product-specific warranty terms which are written into the user manual of each product.*

1.7 THE INFORMATION AND WARNING SYMBOLS IN THE MANUAL

The warnings in this manual have been divided into three classes as follows.

DANGER indicates a hazardous situation which, if realized, will result in death or serious injury.

WARNING indicates a hazardous situation which, if realized, could result in death or injury.

CAUTION indicates a situation which, if realized, may result in property damage.

1.7.1 Warning symbols

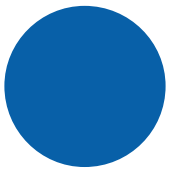
Warning symbols are used in the manual to describe a danger, prohibited action or required action (order).

Danger

A black symbol inside a yellow triangle describes a danger

Prohibition

Black symbol in a red circle describes a prohibited action



Direction sign

White symbol on blue background describes an action that must be performed in order to avoid danger.

1.8 CONTACT INFORMATION

www.kesla.com

SPARE PART ORDERS	*spare.parts@kesla.com*
SERVICE AND WARRANTY ITEMS	*after.sales@kesla.com*
Spare parts and services	*tel. +358 40 709 2208*

2 SAFETY INSTRUCTIONS

2.1 GENERAL SAFETY INFORMATION

Please read and understand the operation, maintenance, and safety instructions before operating or servicing the cranes. Operation, maintenance and adjustment may only be carried out by people qualified for operating and servicing the specified device. Lack of information on the device's operation and characteristics can cause serious injury or death.

The user must always wear safety equipment
such as a safety helmet, protective clothing, safety footwear, hearing protection, safety glasses and other protective equipment in accordance with the provisions required for work.

If the machine has a main power switch, open it before leaving the machine unattended.

- ***Follow the precautionary and operating instructions attached to the machine. This will avoid accidents when working with crane.***
- ***Plan your work carefully in advance in order to avoid any possible damage and accidents. The operator must master the functions of the device prior to its introduction.***
- ***When working with the crane, make sure that the platform that supports the crane is so sturdy that there is no danger of the crane falling.***
- ***Never start a job you are not trained to do and for which you have no authorisation.***
- ***Notify the crane's operator about any maintenance and repair work being started.***
- ***When working ensure that there are no people in the crane's danger zone.***
- ***When starting the drive unit, the hydraulic power must be disconnected from the device.***
- ***Do not leave the running drive unit alone even for a moment.***
- ***Before any maintenance and repairs to the crane, make sure the crane is on a stable surface. Turn off the vehicle's engine, turn off the hydraulic pressure from the device, set the parking brake and remove the ignition key from the ignition switch.***
- ***Mark the construction site with signs, if necessary.***
- ***Do not cede the crane to anyone until you have ensured that the person is adequately informed of the machine's operation and safety instructions.***
- ***The crane's use is forbidden when under the influence of alcohol or other intoxicating substances.***
- ***Use great caution when attaching or detaching the crane from the drive unit or trailer truck.***
- ***Clean and wash the crane regularly and always before starting any maintenance or repair works.***
- ***Never use a broken crane as there is risk of accident in case the structure suddenly fails.***

2.2 THE BIGGEST SECURITY RISKS WHEN OPERATING AND MAINTAINING THE CRANE

DANGER

PINCH HAZARD

- **Hands or other parts of the body can be trapped inside the device's framework or under the load resulting in death or serious injury.**
- **Use great caution when working in the vicinity of the machine. Always wear appropriate (CE-approved) safety equipment.**
- **Do not work the machine's danger area unless it is turned off.**

DANGER

DANGER OF ELECTRICAL SHOCK!

Touching high-voltage wires will result in death or serious injury.

- ***When using the device, please follow the safety distances between live wires.***

WARNING

DANGER OF HIGH-PRESSURE LIQUID JETS!

- **High-pressure jets of oil can shoot out of faulty hydraulic hoses and cause serious injury when coming in contact with skin.**
- **Check the hoses condition regularly and replace the worn/damaged with new ones.**
- **In case of an accident, please seek immediate medical attention.**

DANGER	
	TIPPING HAZARD! • ***Instability of the device may cause its unexpected movement that could result in death or serious injury.*** • ***Never exceed the maximum slope angles when parking or operating the machine.***

- **Noise emission exposure made by the machines can cause weaker hearing or even worse hearing loss.**
- **The noise level at the work site depends on the sound proofing of a the truck or any other machinery's sound proofing, as well as the from the position of the control valves.**
- **The manufacturer recommends when needed the use of appropriate and effective personal hearing protection.**

2.3 SAFETY INSTRUCTIONS

** The crane's operator is responsible for operating the crane safely.*

** The user must be at least 18 years old and his/her hearing and vision must be so good that it is safe to work.*

WARNING	
	RISK OF FALLING • **When rising to the control position and leaving it, use the machine's steps and handholds so that both hands and one foot or one hand and both legs have stabilize.Check the hoses condition regularly and replace the worn/damaged with new ones.** • **Do not jump!**

** The floor at the control position has to be kept empty of loose objects.*

** There should not be any other persons at the control position.*

** Adjust the seat and controls and keep the windows clean.*

** Wear a seat belt, if possible.*

** Check that the crane has been properly mounted*

** Use great caution when attaching or detaching the crane from a vehicle.*

- the surface must be sufficiently strong and steady.

- rotation of the stabilizer leg must be prevented with a locking pin (against tipping hazard)!

- check that the rear mounting bracket has been locked to the vehicle with a chain.

** Always connect the return hose before the pressure hoses. Make sure that it has been connected; otherwise the control valve may become damaged.*

** After installation there could be air in the hydraulic system which causes sudden and uncontrollable movements. Remove the air by brining all the cylinders carefully to the extreme positions 4-5 times.*

** Check before switching on the pressure that all the crane's control levers are in the middle position and that they also return to the middle position.*

** Always apply parking brakes for the time of loading. If necessary, place blocks in front of wheels.*

** Stabilizer legs are operated from a valve attached to the base or from the control position by remote control.*

** Spread out the Stabilizer legs as wide as possible to achieve good standing stability. If this is not possible, start loading with small loads.*

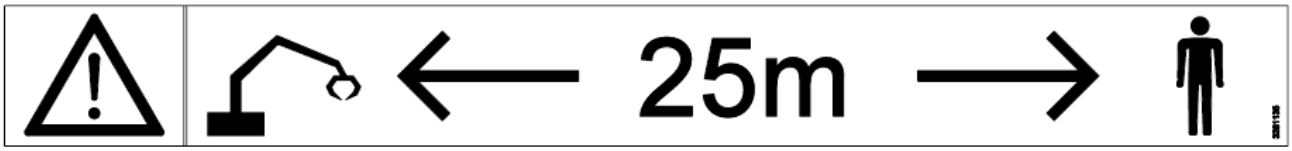
** The stabilizer legs are fitted with pressure-controlled check valves, so they hold in case of a possible overload or hose failure. The stabilizre legs are prevented from turning by pin locking, if necessary. (For example, a stand-mounted crane is removed from the truck to its stabilizer legs). Pin locking cannot be used during working.*

** Please note that when the load increases, most of the weight goes to the stabilizer legs because the truck springs have been lightened by stabilizer legs. As a result, it is recommended to shorten the stabilizer legs in the mid of loading, in which case the weight shifts to the truck wheels.*

** Avoid loading on a sloping surface. If this is not possible, use extreme caution and lift small loads. When loading uphill, please remember that the pressure relief valve of reversing cylinders can become overloaded and the load can escape downhill and cause an incident.*

** The aggregate's standing stability is at its weakest when the load space is empty. When the aggregate begins to fall, lower the grapple immediately to the ground. Do not drop the load by opening the grapple.*

2.3.1 Danger zones during use

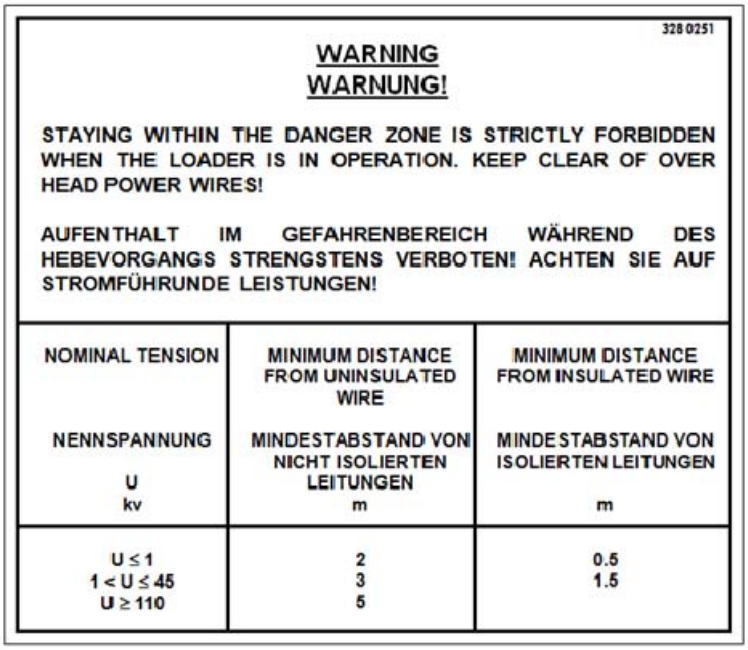


** The label is big, attached to both sides of the hinged boom and indicates the danger zone during operation.*

- ***Make sure that there are no unauthorized persons in the danger zone during loading.***

** The crane is supplied with a label regarding safety distances from live wires. The label must be affixed to a location where it is easily readable when using the crane.*

** The label is placed to the control position and strictly forbids the presence of people in the danger zone during lifting (danger zone 25 m).*



328 0251

WARNING
WARNUNG!

STAYING WITHIN THE DANGER ZONE IS STRICTLY FORBIDDEN WHEN THE LOADER IS IN OPERATION. KEEP CLEAR OF OVER HEAD POWER WIRES!

AUFENTHALT IM GEFAHRENBEREICH WÄHREND DES HEBEVORGANGS STRENGSTENS VERBOTEN! ACHTEN SIE AUF STROMFÜHRUNDE LEISTUNGEN!

NOMINAL TENSION NENNSPANNUNG U kv	MINIMUM DISTANCE FROM UNINSULATED WIRE MINDESTABSTAND VON NICHT ISOLIERTEN LEITUNGEN m	MINIMUM DISTANCE FROM INSULATED WIRE MINDESTABSTAND VON ISOLIERTEN LEITUNGEN m
U ≤ 1 1 < U ≤ 45 U ≥ 110	2 3 5	0.5 1.5

2.3.2 Safety devices

** The crane's hydraulic system is equipped with various safety valves in order to ensure safe working.*

** Changing the settings of valves without a written permission is strictly prohibited.*

** The pump circuits of the truck's hydraulic system must be equipped with pressure relief valves with opening pressure at least twenty (20) bars higher than the opening pressure of the crane's main release.*

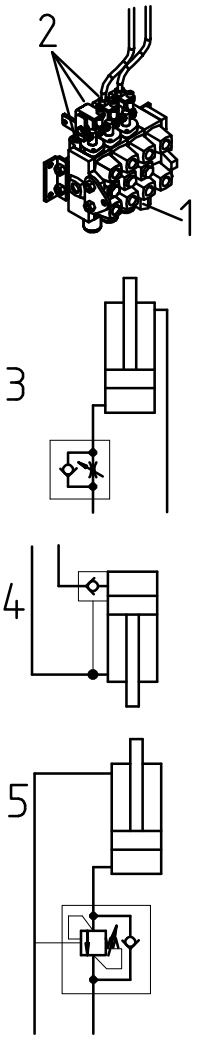
1. The main release prevents the working pressure to rise too high. There is one on each pressure control valve over each pressure connection. If the pressure of oil coming to the control valve exceeds the set value, oil will be discharged to the tank channel until the set pressure level has been reached once again.

2. Cylinder-specific pressure relief valves prevent the pressure to rise too high in different cylinders. If the cylinder exceeds the set pressure value, oil will be discharged from the cylinder through the pressure relief valve until the permitted pressure value has been reached.

3. Throttle check valves are used in swing, lift, and transfer cylinders. They regulate the travel speed of the booms so that the speed is adequate and the corresponding cylinders get enough filling oil from the pump.
** **NOTE! The check valve's adjustment should be done when unpressurised**(Pump has been switched off); the valve can become damaged.*

4. The stabilizer legs are equipped with pressure-controlled check valves (lock valve). They prevent the legs from collapsing in case of a possible overload or hose failure.

5. A swing, lift, and transfer cylinder can be equipped with an overcenter valve, if necessary. It locks the load into the desired position and prevents the load from falling in case the hose breaks. The load's descent takes always place in a controlled way.



2.3.3 Emergency stops

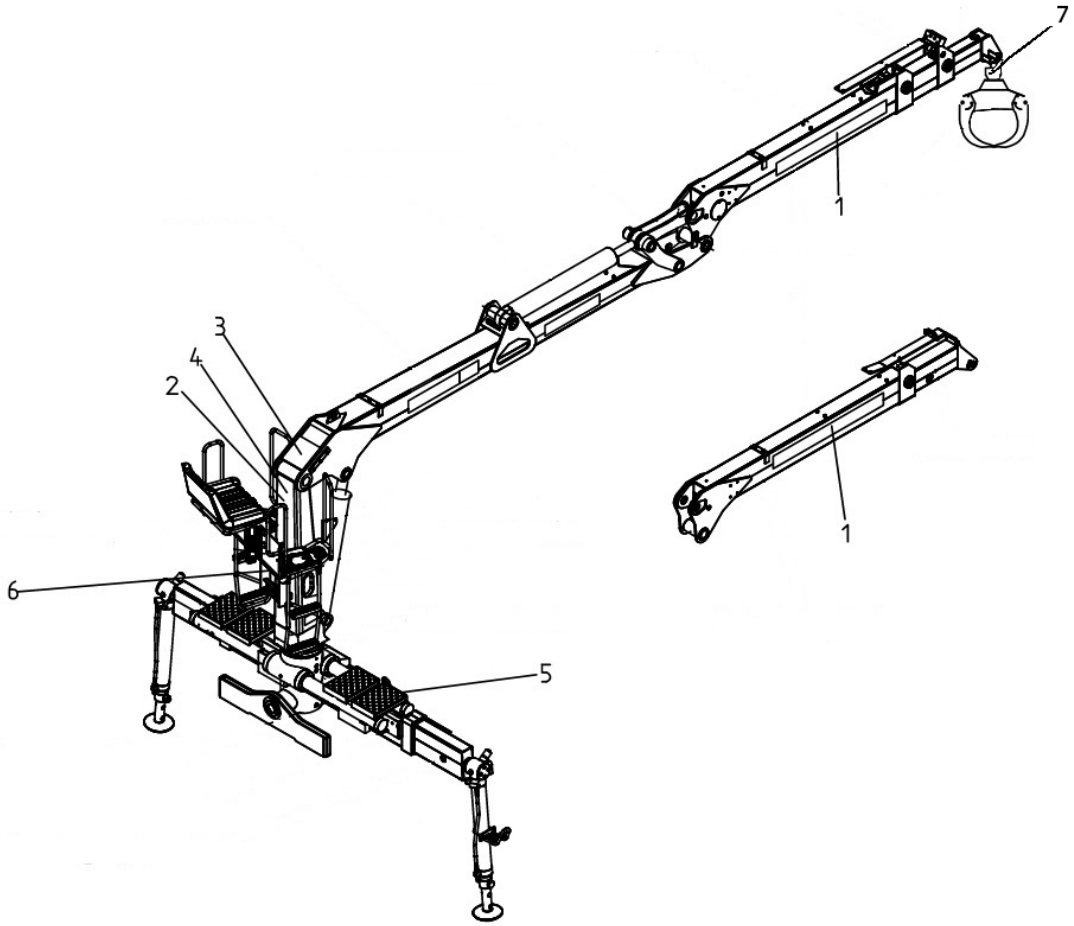
*he crane's control system must be equipped with a **STOP**switch located in the crane's control position. It can be used to cut off crane's oil supply (e.g. by an electrically controlled valve) or, alternatively, the electric current to the pilot-operated control valve. Also the stopping of the drive unit is considered as a **STOP**- operation, if it can be done from the control position.*

2.3.4 Priorities and dimension drawings

More detailed device-specific information can be found in the booklet's APPENDIXES (10)

2.3.5 Caution and warning signs on the crane

The crane has warnings and instructions attached to various spots, regarding the danger or instructions related to its use. By following them you can avoid accidents and machine breakdowns. If the machine's warning labels become detached or torn, they must be immediately repaired.



LABEL NO. 1 DANGER ZONE LABEL

** The label is big, attached to both sides of the hinged boom and indicates the danger zone during operation.*

.

** Staying in the danger zone during lifting is strictly prohibited.*

LABEL NO. 2 WARNING LABEL

328.0251

WARNING
WARNUNG!

STAYING WITHIN THE DANGER ZONE IS STRICTLY FORBIDDEN WHEN THE LOADER IS IN OPERATION. KEEP CLEAR OF OVER HEAD POWER WIRES!

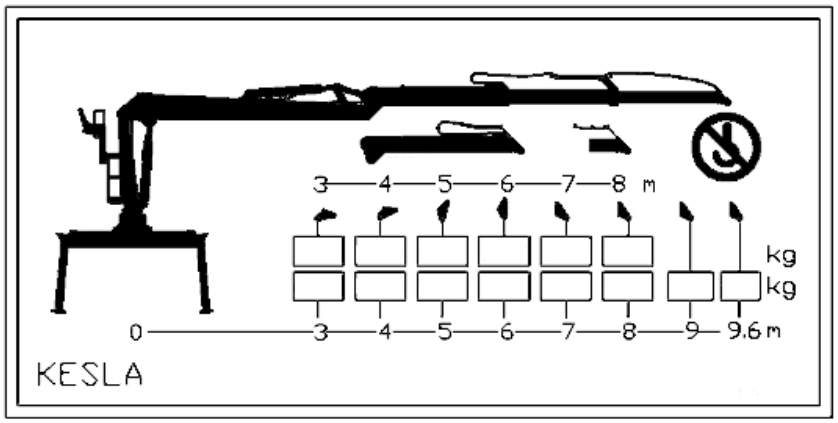
AUFENTHALT IM GEFAHRENBEREICH WÄHREND DES HEBEVORGANGS STRENGSTENS VERBOTEN! ACHTEN SIE AUF STROMFÜHRUNDE LEISTUNGEN!

NOMINAL TENSION NENNSPANNUNG U kv	MINIMUM DISTANCE FROM UNINSULATED WIRE MINDESTABSTAND VON NICHT ISOLIERTEN LEITUNGEN m	MINIMUM DISTANCE FROM INSULATED WIRE MINDESTABSTAND VON ISOLIERTEN LEITUNGEN m
U ≤ 1 1 < U ≤ 45 U ≥ 110	2 3 5	0.5 1.5

** The label is placed to the control position and <u>strictly</u> forbids the presence of people in the danger zone during lifting (danger zone 25 m).*

** The label warns about live electrical wires. If you need to work or to drive under a power line, follow the minimum distances given in the table.*

PLATE NO. 3 LOAD PLATE



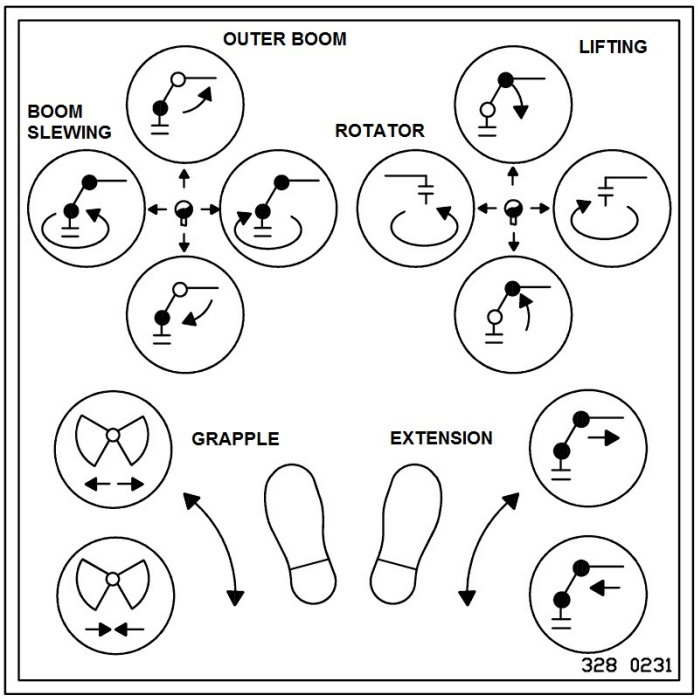
** Plate with safe load charts*

** The load plate is located at the control position and indicates the maximum load with different lifting reaches.*

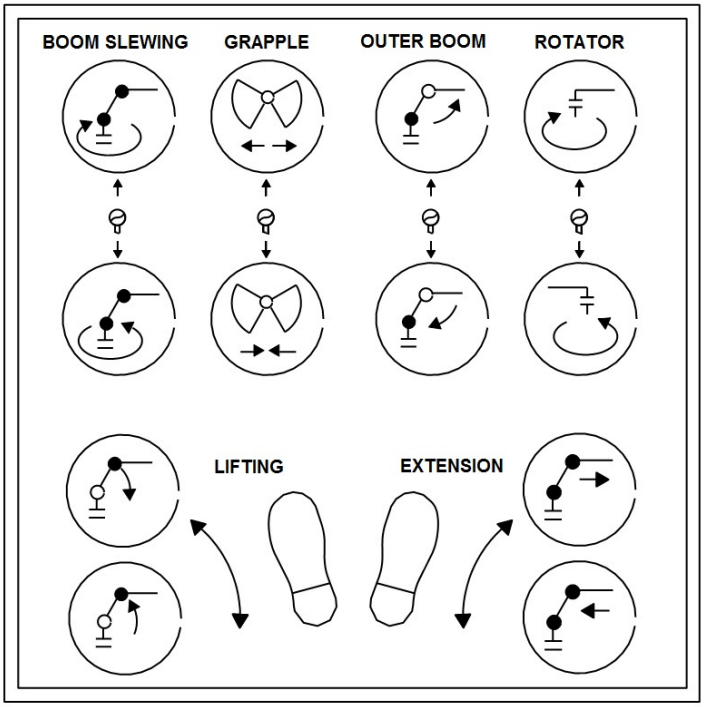
** Operation with hooks is not allowed!*

LABEL NO. 4. CONTROL CHART LABELS

Two-lever control valve
(No. 3280231)



Four-lever control valve
(No. 3280197)

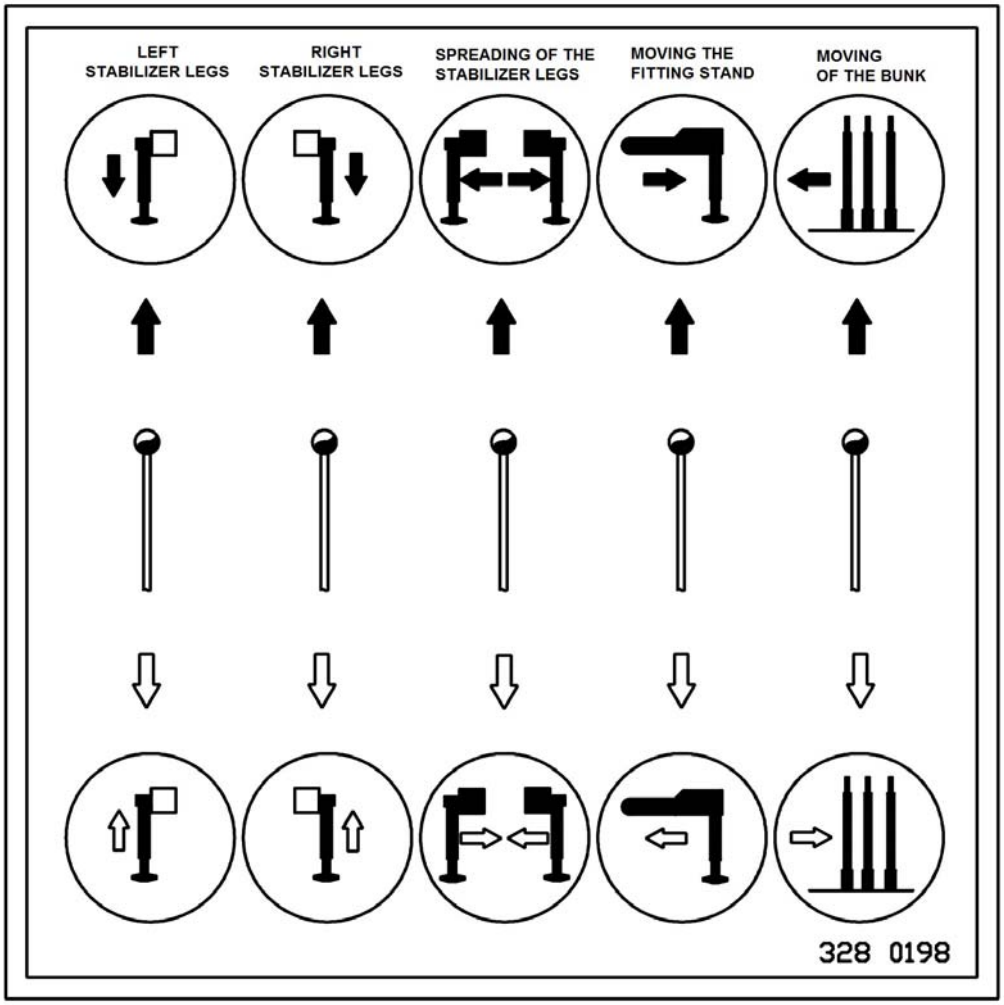


** The control chart label is located at the crane's control position and has, according to the control valve, either 2 or 4 levers.*

** The label shows the functions of levers and pedals.*

LABEL NO. 5 CHASSIS CONTROL CHART

(background: yellow, text: black, no.: 3280198)

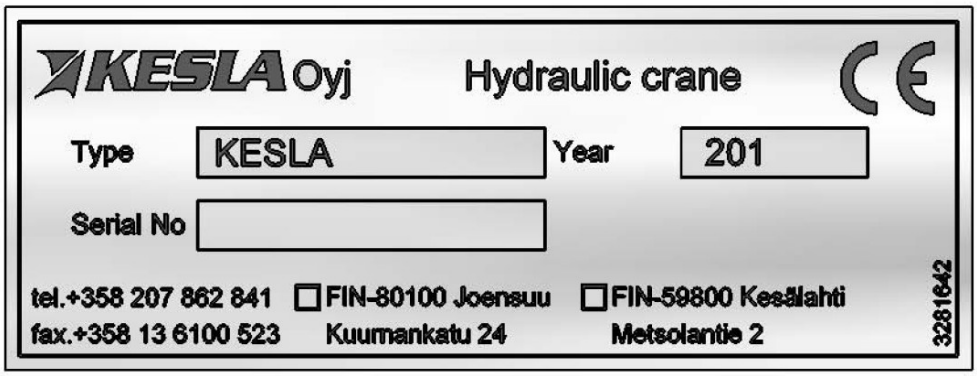


** There are 2 label with the chassis control chart. One is located at the crane's control position and the second at the chassis control position.*

** The chassis control valve (=stabilizer leg valve) can be used from the crane's top control position electrically by lever switches or mechanically with cable control. In addition, it can be controlled directly by valve levers from the chassis control position*

** The chassis control valve can have 3 to 5 functions depending on the crane's installation method and the truck's equipment. For example, in case of a truck with bunk adjustment:→ 5-spool chassis control valve. Fixed installation, no bunk adjustment:→ 3-spool chassis control valve.*

PLATE NO. 6



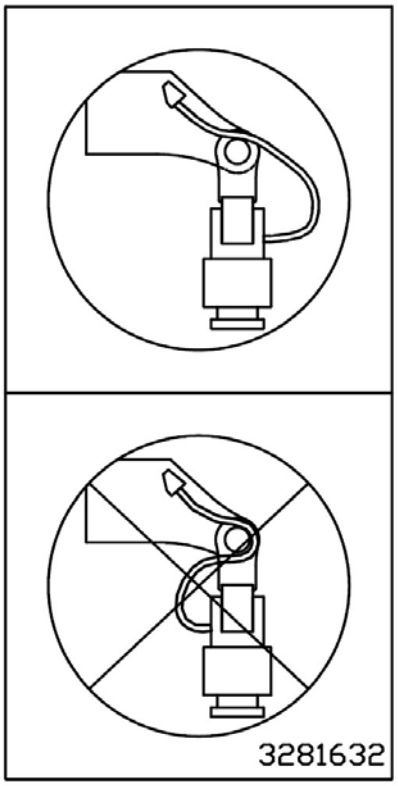
** Machine plate*

** The product plate shows the manufacturer's name and address, and the crane's designation of type (e.g. KESLA 2010T), as well as the serial number and year of manufacture.*

** CE: A pan-European approval.*

LABEL NO. 7 INSTRUCTION LABEL

Installation instructions for rotator hoses!



2.4 HYDRAULIC SYSTEM

- ***Follow the safety instructions regarding the hydraulic system when connecting and using the loader's hydraulic system.***
- ***The hydraulic system can be maintain and repaired and the related components can be installed only by trained operators.***
- ***Do not start works that you do not master completely.***
- ***Check the hydraulic system's maximum allowable pressure from the specifications in the user manual!***

DANGER	
	DANGER OF FALLING LOADS! • **A device or component that is supported upon the hydraulic system may fall, causing serious injury or death.** • **Support the device parts with appropriate supports before servicing or repairs.**

WARNING	
	DANGER OF High-pressure liquid jets! • **High-pressure jets of oil can shoot out of faulty hydraulic hoses and cause serious injury when coming in contact with skin.** • **Never try to locate a leak by palpating.** • **If the system has pressure accumulators, they must be depressurised before maintenance procedures!**

RISK OF ACCIDENTS!

- ***Due to commissioning, repair, maintenance or other reasons, air may have entered the hydraulic system, which can cause unpredictable movements. These movements can result in death or serious injury.***
- ***Be especially careful when starting the crane.***
- ***When starting the drive unit, the device must be disconnected from hydraulic power.***

- ***In case of repairing or servicing the hydraulic components, only original spare parts may be used***
- ***Use only the parts with sufficient pressure resistance.***

RISK OF ACCIDENTS!

- ***Increasing the pressure in the hydraulic system over the allowed values can result in serious injury and material damage.***
- ***It is strictly prohibited to change the pressure values of the valves of the hydraulic system***

2.5 SAFETY INSTRUCTIONS FOR HANDLING CHEMICALS

⚠ WARNING

RISK OF ACCIDENTS!

- **Oils and greases may include additives that can be harmful to the environment or when in repeated contact with skin.**
- **When processing these substances follow the guidelines and rules issued by the manufacturerand the authorities.**
- **The waste oil released during servicing or repairs must be taken to be properly processed.**

- ***Use appropriate protective clothing, protective skin creams or proper gloves when handling oils and greases.***
- ***Avoid contact with skin!***

- *Never use lubricating oil or greases to clean your hands. The possible metal particles and additives of lubricants could damage the skin.*
- *Do not use clothes spoiled with oil or grease.*
- *Do not store oily tools or other oily objects in your pockets.*

2.6 WELDING THE CRANE

- ***Determine the material to be welded and the appropriate welding process and consumables before welding. If necessary, contact Kesla.***
- ***Follow the welding instructions and use appropriate welding methods.***
- ***Always wear appropriate safety equipment.***

- *If repair welding of structures is required, it is essential to contact the production plant, which will provide the necessary repair instructions and other considerations. Repair welding has to be carried out professionally, as an inadequately repaired structure may suddenly break and cause an accident.*
- *Turn off the drive unit and turn its ignition key to position 0.*
- *Open the main switch.*
- *Protect sensitive components from welding spatters.*
- *Attach the welding machine's grounding cable directly to the component to be welded. Attach the cable as close as possible to the welding point, so that the welding current does not pass through bearings, hydraulic components or electronic components.*

2.7 INSTALLING ACCESSORIES AND MODIFYING THE DEVICE STRUCTURE

Any changes made to the crane without Kesla's approval and a reappraisal of risks can result in death, serious injury or material damage.

All changes and repairs that are not listed in the maintenance manual and that may affect the machine's operation, safety and usability, are subject to Kesla's approval before they are carried out. The approval requires a careful risk analysis during the planning phase that would take into account the remaining risks and any new risks possibly caused by the changes.

- *If changes and corrections are made without Kesla's permission that hamper the machine's operation, safety and usability, the manufacturer is not liable for any events causing death, injury or material damage, which is the result of such changes or repairs.*
- *Changes without Kesla's permission may invalidate the warranty.*
- *Contact the manufacturer before making any changes in the crane structure. Modifying the structure may result in an overload situation and risk of accidents.*

2.8 SAFETY PRECAUTIONS ON THE ROAD

- ***Do not ever exceed the permitted shaft weight and total weight and the transport dimensions.***
- ***Ensure that the aggregate's controllability during travel is maintained in all situations. Also take into account the increased braking distance.***

- *Before transporting the crane, set it in transport position.*
- *Ensure that the aggregate's controllability during travel is maintained in all situations. Also take into account the increased braking distance.*
- *Follow the safety distances from electric cables when in the vicinity of power/telephone lines.*
- *Take into account the aggregate's height when driving under overpasses.*
- *Obey all road traffic rules and regulations when driving on public roads.*
- *Make sure before driving that all required equipment: lights, reflectors and warning devices are properly in place and working.*
- *Also check the tire pressure.*
- *Do not transport the vehicle under the influence of alcohol or drugs.*

2.9 USER'S MANUAL KESLA CE -EQUIPMENT

2.9.1 Load indicator

There is a signal light at the post of the pilot of the crane, indicates the load in use to the user (Figure 1.1or 1.2). The system is based on the measure of the lifting pressure. The signal light has three colors, each of which indicates a different situation.

Green *Normal load.*

Yellow *The load is close to the maximum capacity of the crane, 90 – 100 % of the maximum load. The load cannot be increased to any considerable degree.*

Red *Overload, the load must be decreased immediately.*

Shorten the extension or decrease the load to be lifted!

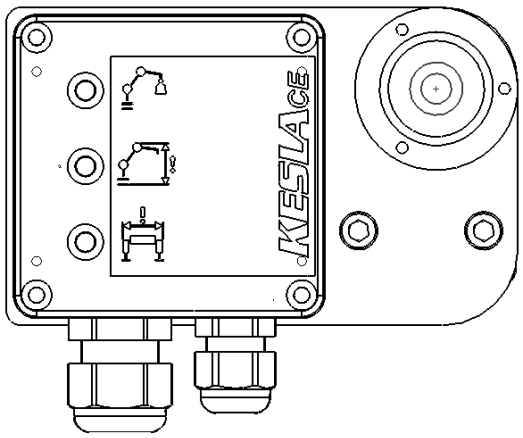


Figure 1.1 Outdoor control

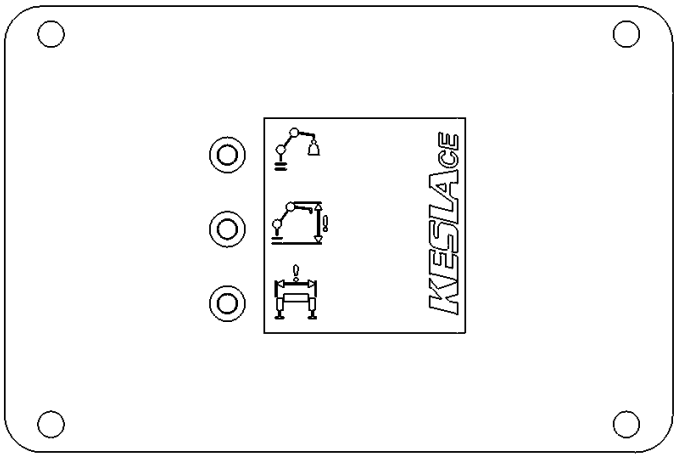


Figure 1.2 Cabin

2.9.2 Height indicator

The lifting beam is equipped with a sensor which controls the angle of the beam and indicates if the maximum height is passed, in this case the red signal light turns on at the driver's post. The signal light must be taken into account if the crane is positioned at the rear of the truck on top of the load during transportation.

2.9.3 Adjusting the sensor

The crane is lifted to the rear of the truck so that its highest point is at the maximum height of the vehicle (Figure 2.1).

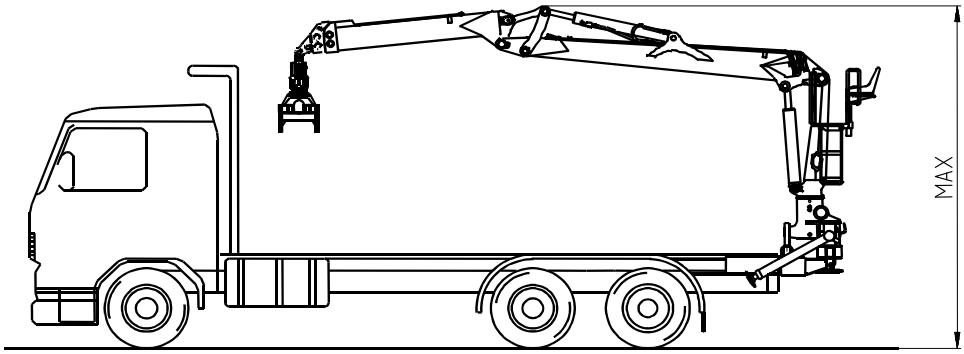


Figure 2.1

After this the sensor is turned into its position (indicated by an arrow in figure 2.2), this turn on the signal light. After this the sensor is tightened so that it cannot move.

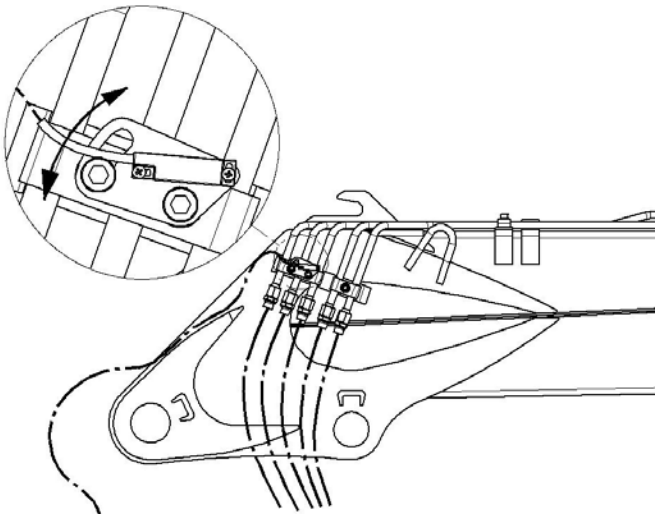


Figure 2.2

Before starting to drive the driver has to make sure that the height of the vehicle does not exceed the authorized maximum height.

If the loading is done on a slope or on an uneven surface, you must not rely on the indication of the signal light, instead you must measure the eight of the vehicle.

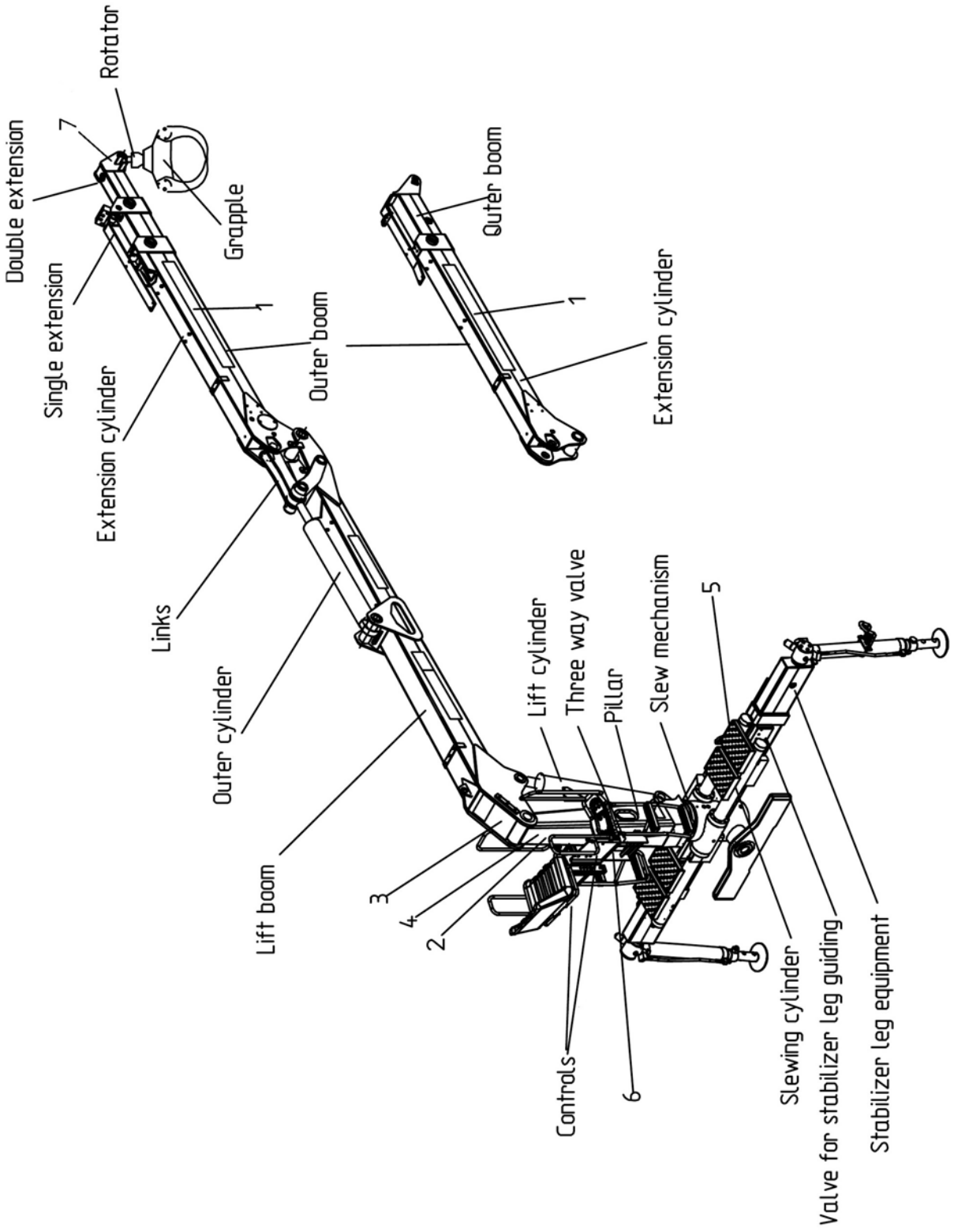
2.9.4 Outrigger indicatior

Outrigger indicator light glows red when the outriggers are spread.

The outrigger may not be spread out while driving!

3 ABOUT THE CRANE

3.1 CRANE'S MAIN COMPONENTS



3.2 CRANE OPERATION

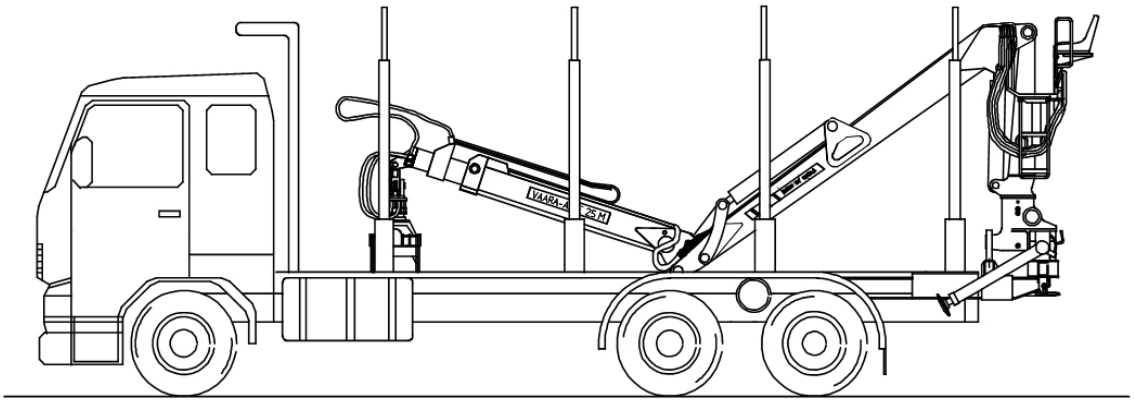
In order to function the crane needs a drive unit and a hydraulic pump connected to it, as well as the necessary hydraulic equipment (such as an oil tank, filters, hydraulic pipes). All movements are hydraulic. Different functions (turning and lifting the boom, compressing the grab, etc.) are achieved by channelling pressurised oil with the hydraulic cylinder to the desired control valve. The crane operator can control a number of functions simultaneously, as required.

3.3 CRANE EQUIPMENT OPTIONS

3.3.1 Basic crane models

KESLA timber handling cranes are delivered from factory as complete tested assemblies with several options for standard equipment from which the customer can choose the most suitable one.

- Basic crane



** Controls can be mounted directly behind the tower or to its side.*

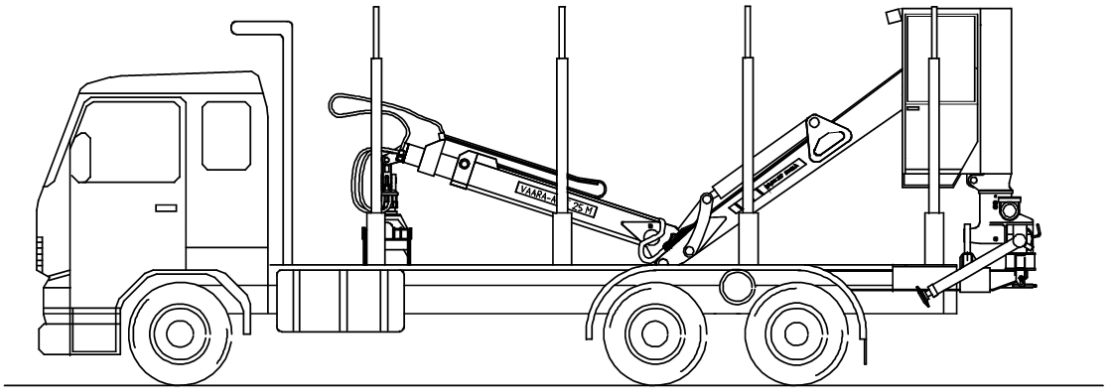
** The control valves are delivered with 2 or 4 levers according to the customer's choice.*

** The low control valve (= bearer foot valve) is delivered, according to the operations required, with 3 to 5 stems (for example bunk transport, stand transport, etc.). In addition, it can be either electronically or mechanically controlled.*

** The hinged boom can be with 1 or 2 extensions.*

** The hydraulic system can be either a one-circuit (1 pump) or a two-circuit (2 pumps) system. In addition, the system can be implemented with either a fixed-displacement or an adjustable-displacement pump.*

- Cabin crane



** The cabin should be mounted on guides attached to the tower side, where it can be moved hydraulically up and down.*

** Controls (with 2 or 4 levers) are located in the cabin. The control valves are controlled either mechanically (located in the cabin) or electronically (located in the tower).*

** The crane's equipment options are the same as for the basic crane.*

3.3.2 Crane accessories

Several accessories are available for the KESLA timber handling crane making it's use even more comfortable.

4 COMMISSIONING

This section of the manual explains the preparations and special safety precautions to be followed before starting to work.

4.1 SAFETY INSTRUCTIONS FOR THE CRANE'S COMMISSIONING

**** The KESLA crane is designed for loading with a grapple and it can be used only by a person familiar with its use.***

**** Operation with hooks is not allowed!***

** Acquaint yourself with the crane's structure, operation, control devices and use instructions before its commissioning.*

** It is forbidden to use the crane unless the use and safety instructions have been studied.*

** Follow the instruction and warning texts attached to the crane in order to avoid unnecessary damages.*

** Make sure that the aggregate is sufficiently stable in all circumstances.*

** Check that the crane has been properly mounted (see "Crane mounting").*

** When starting the vehicle it must not be connected to hydraulic pressure.*

** Use great caution when attaching or detaching the crane from a vehicle.*

- the surface must be sufficiently strong and steady

- rotation of the stabilizer leg must be prevented with a locking pin (against tipping hazard)!

- chain locking of the rear mounting bracket to the vehicle

** Always connect the return hose before the pressure hoses. Make sure that it has been connected; otherwise the control valve may become damaged.*

** After installation there could be air in the hydraulic system which causes sudden and uncontrollable movements. Remove the air by brining all the cylinders carefully to the extreme positions 4-5 times.*

** Check before switching on the pressure that all the crane's control levers are in the middle position and that they also return to the middle position.*

4.2 PREPARATIONS FOR CRANE COMMISSIONING

** Truck-mounted timber handling KESLA cranes will be delivered from the factory as complete units with service valves, pressure filters and hydraulic equipment. The grapple, rotator, etc. will be delivered as accessories.*

** The carrier block is made of timber that can be reused or disposed by burning.*

** For handling the crane a hoisting apparatus is required with hoisting capacity of at least 39 kN (4.000 kg). A forklift can be used for lifting from below the carrier block (NB! tip-over hazard).*

** The crane will be transported on its carrier block to the mounting location where the fasteners and clamps for transporting will be removed.*

** Visible cylinder shafts are protected. Remove the protective substance (for example with petroleum) as the impurities that adhere to it could damage the seals.*

- ***Before actually mounting the crane, required fittings have to be made to the truck, including mounting of the hydraulic pump/pumps, hydraulic oil tank and hydraulic pipes.***

The size of the pump has to be chosen according to the nominal flow of the adjusting valve.

- ***An oversized pump will cause counter pressure and heating of the oil. Do not use an oversized pump. If need be, the flow values can be obtained from the adjusting valve's supplier.***
- ***The suitability of the truck's hydraulic system with the crane must always be checked.***

** When mounting the sheaths of the rear mounting bracket or a mounting plate (fixed installation) the instructions of the truck manufacturer/importer must be strictly followed.*

** Prior to the crane's mounting one should calculate whether the aggregate is sufficiently stable. (see the instructions on how to calculate the crane's standing stability).*

4.3 CRANE MOUNTING

The crane can be mounted only by an installation company or a person authorised by the manufacturer.

** All the crane's functions have gone through a scrupulous trial run and the pressures have been measured. The oil for pre-filling of the hydraulics is TEBOIL ECO 46.*

** The installation company must mark the truck or the crane with an attached type plate that contains the installation company's name and address, year of installation, the crane's serial number, the truck's chassis number or licence plate number and the CE-marking.*

** The crane can be mounted to a movable stand behind the truck or fixed to the trailer truck, behind the cabin and behind the truck.*

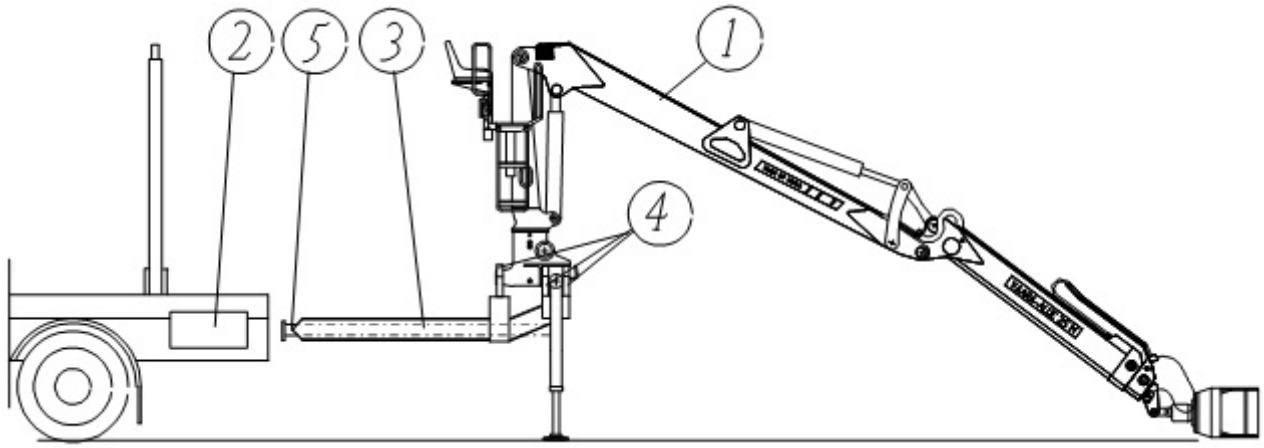
- ***The mounting console of the crane should be robust enough***
- ***The mounting console has to be built and fastened into the vehicle frame in the manner that it will withstand the loads on it, and will comply with vehicle manufacturer's demands on frame strength.***

4.3.1 Installation to a movable stand behind a truck

** Fastening sheaths (2) should be mounted to the truck for the installation of the bracket (3).*
- follow the truck manufacturer's/distributor's instructions.

** The rear mounting bracket (3) should be lifted to the fastening sheaths (2).*

** The rear mounting bracket can be fitted with a stand manoeuvring cylinder (5), in which case the truck will be fitted with an appropriate mounting kit with locking. Alternatively, the manoeuvring cylinder can be installed to the truck's side and the mounting kit to the stand.*



** The crane (1) should be lifted to the stand (3) and 6 pcs of studs M30 (4) mounted to the stand's outermost holes. The studs should be tightened step by step with a torque wrench to 1.200 Nm (122 kpm).*

- ***The falling of the rear mounting bracket must be prevented with a safety chain..***

**Ensure that the rear mounting bracket's cross bar cannot move in the direction of shafts.*

** Connect the crane's return and pressure pipes to the truck's hydraulic system. The truck's quick release couplings are to be replaced with new ones, if necessary.*

** The crane can also be fixedly mounted behind the truck (see section 2).*

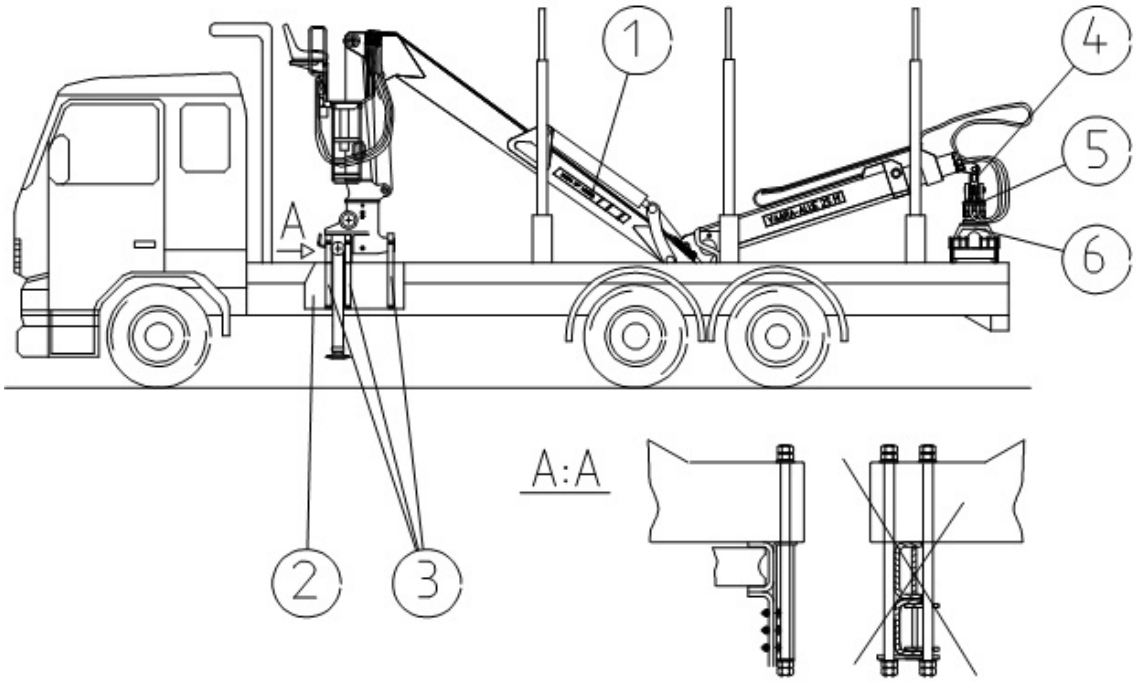
- ***At this stage a commissioning inspection has to be carried out***

4.3.2 Installing the crane behind the cabin

** To the sides of the truck's subframe/frame bolt-on plates PL 10 (2) should be installed, with welded sleeves for stud bolts M30 (3).*

- Follow the mounting instructions provided by the truck's manufacturer/importer

- Truck manufacturers do not recommend clamp mounting that would compress the frame beams or welding directly to the frame beams.



** The crane (1) should be lifted on top of the mounting plates (2) (it should not remain upon the frame beams) and the six M30 studs (3) should be installed to sleeves. The studs should be tightened step by step with a torque wrench to 1.200 Nm (122 kpm).*

** Install the grapple equipment: shackle (4), rotator (5), grapple (6) + hydraulic pipes, unless this has not already been done at the factory.*

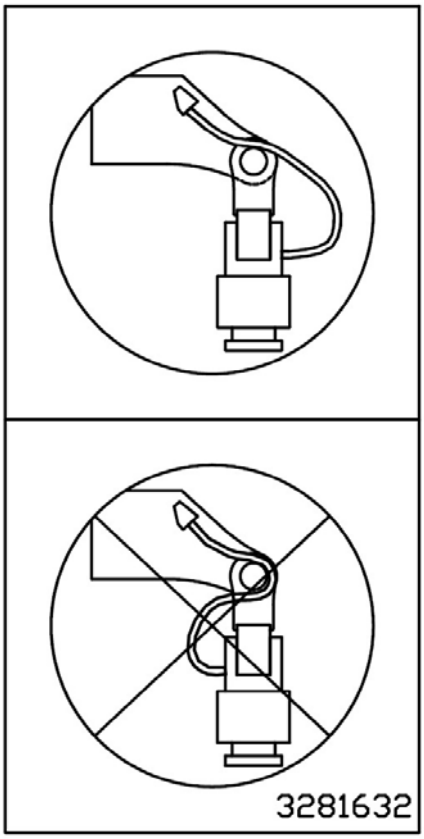
** Connect the crane's return and pressure pipes to the truck's hydraulic system*

- ***At this stage a commissioning inspection has to be carried out.***

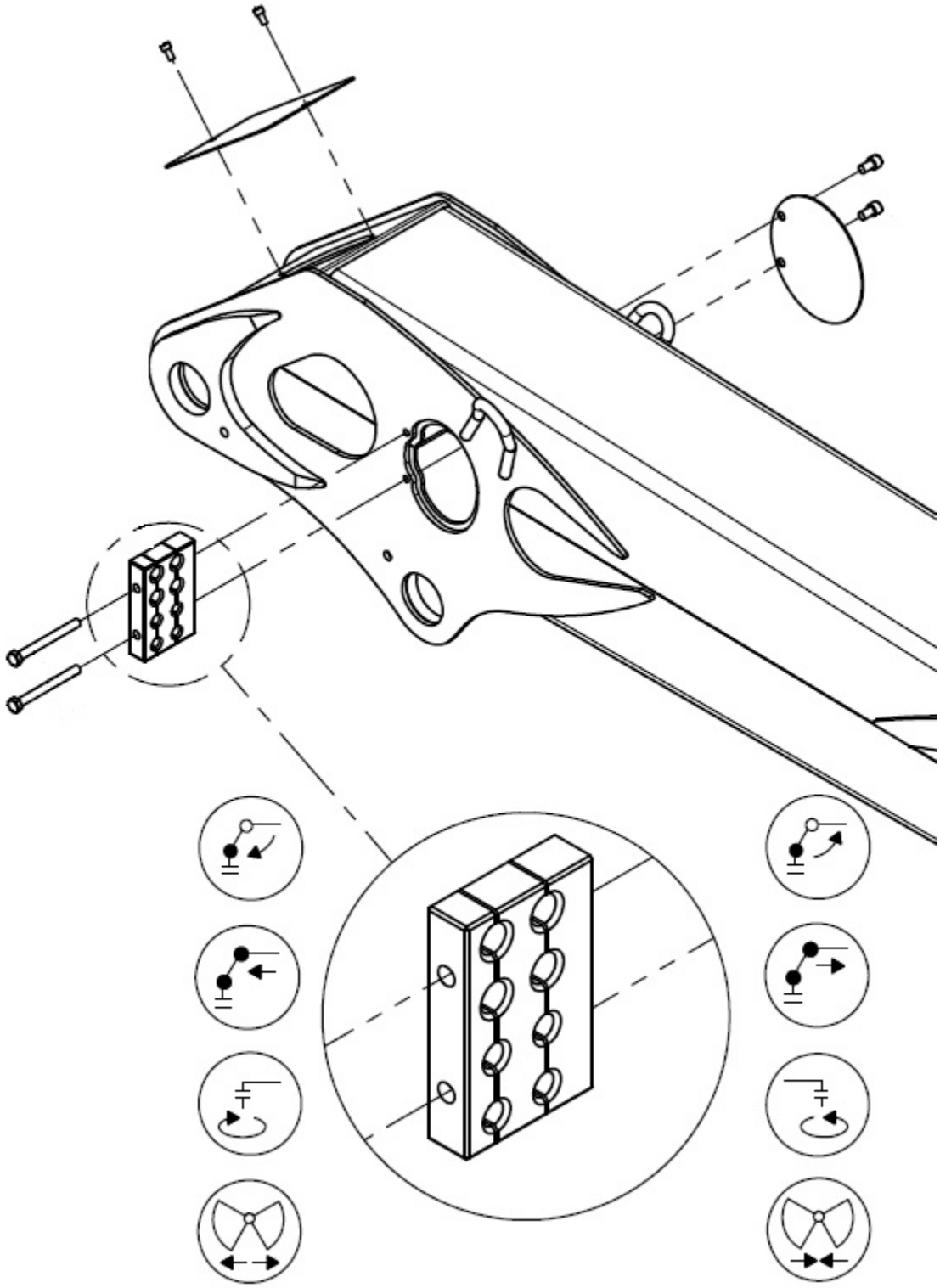
4.3.3 Installation of the rotator and its hoses in Keslink:

Rotator hoses should always be installed as illustrated when using Keslink.

Kesla Oyj prohibits to use installation methods that differ from the image when installing hoses to the rotator, as different installation methods could violate competitors' patented hosing solutions. Installation differing from the instructions also considerably reduces the service life of hoses and Kesla Oyj's warranty will not be valid in case of improper installation.



4.3.4 Hose connections



4.4 INSTALLER

4.4.1 Safety instructions

Please read and understand the operation, maintenance, and safety instructions before operating or servicing the cranes. Operation, maintenance and adjustment may only be carried out by people qualified for operating and servicing the specified device. Lack of information on the device's operation and characteristics can cause serious injury or death.

4.5 INSPECTIONS

Inspectors:

The person that performs the commissioning inspection and periodic inspections must be a community of experts validated by an assessment body intended in § 4 of the regulation on the accreditation of assessment services (920/2005) or by an independent expert approved by a certification body validated by an assessment body

Protocol storage:

The crane is supplied together with protocol forms for the commissioning inspection and periodic inspections. The forms must be completed for each inspection and must be stored in a visible and accessible place at the crane or in its immediate vicinity during the crane's entire service life.

Safety instructions:

The same safety precautions are valid both for inspections and for normal operation

4.5.1 Commissioning inspection

Before first commissioning as well as before commissioning after any safety-critical repair and modification works a commissioning inspection of the crane has to be carried out. It shall include measures according to the commissioning inspection protocol (Appendix 1), including inspection of parts and equipment relevant to safety, a test loading according to the standard SFS EN 12999 or manufacturer's instructions and, if necessary, an inspection of the crane's standing stability (SFS EN 12999). The crane's control system based on contactless (electro-magnetic) data transfer must be checked even when it is installed to a crane that is already in use.

4.5.2 Warranty service

An authorized service centre performs operations according to the warranty service protocol (Annex 2). Continuity of full warranty requires that this maintenance is carried out within 30 days from the crane's installation date.

4.5.3 Periodic inspections

Periodic inspections and a related test run should be carried out to a used crane once every one year and a related test run according to the standard SFS EN 12999 or equivalent should be done once every four years. The inspection consists of procedures according to the periodic inspection protocol (Annex 3) and particular attention should be paid to the fatigue, wear, corrosion, or other damage to the materials resulting from use. In addition it must be checked that structures have not been essentially modified regarding safety.

4.5.4 Thorough periodic inspection

In addition to periodic inspections, the crane requires a thorough periodic inspection no later than 10 years after its first commissioning.

When calculating the time for thorough periodic inspections, one should take into account the intensity of the crane's use, damage observed during periodic inspections, repairs carried out, and any possible type faults in the crane.

In the thorough inspection one should dismantle those safety-relevant parts of the assembly whose functionality cannot be otherwise reliably checked. One should use non-destructive inspection methods in the inspection.

4.5.5 The crane's daily inspection

** Check the hydraulic oil and the rotating device's oil level and top up if necessary.*

** Lubricate the crane if necessary (refer to Maintenance Procedures).*

** Visually inspect the crane's mounting screws, shaft mounts, hoses and any possible leaks.*

** Check visually the state of the frame and the boom structures of the crane!*

** Ensure the management and operation of the safety equipment by running the functions to their maximum and repair any defects immediately*

** Make sure that the **STOP**- switch is working.*

- ***Any use of a damaged or defective crane is prohibited!***

4.6 INSTRUCTIONS ON HOW TO CALCULATE THE CRANE'S STANDING STABILITY

** The standing stability should be determined in connection with the commissioning inspection and made by an authorised installation company or installer.*

NOTE! The calculations related to the stability of the vehicle carrying the load crane can be used only as indicative values. The verification of standing stability should be done experimentally by a test load according to the standard EN 12999.

** The crane is considered to be stable when the sum of overturning moments multiplied by the stability factor is lower than the sum of moments in which the structure is maintained upright.*

** The crane in the most unfavourable position in relation to the overturning edge when under a static load on a horizontal surface. The vehicle is unladen.*

**The stability factor of an installed crane should be approx. ≥1.1.*

** The factors required for and affecting calculation of standing stability cannot be know in advance, therefore the standing stability must be determined case by case depending on the truck make, truck structure, crane's installation location and crane type on the basis of the actual (measured or calculated) weights and dimensions.*

** If, when determining the standing stability, any parameters or questions appear that are not mentioned in the truck's maintenance/registration book, please contact the nearest dealer or importer of the truck make in question. Or Kesla Oyj regarding the crane.*

4.7 INSTRUCTIONS ON HOW TO DETERMINE EXPERIMENTALLY THE CRANE'S STANDING STABILITY

4.7.1 Safety instructions

** The test has to be carried out with special caution: danger of tipping over!*

** Check before the test that all the crane cylinders are deaerated: sudden movements!*

** The surface must be flat and sturdy enough to withstand the load of wheels and other support points*

4.7.2 Test conditions

** During the test the vehicle is in its normal operating conditions without load.*

** Eventual grapple equipment should be removed or weighed into the test load in accordance with the table.*

**The stability test loads have to be determined by the following formula:*

TL=Ks x P + (Ks - 1) x Gb

Where:

Ks= Stability factor 1.1

TL= test load

P= lifting capacity

Gb= boom volume at the lifting accessory's attachment point (see the masses in specifications)

4.7.3 Performance of test

** The stability test has to be carried out with the most unfavourable configuration of the boom/extensions in the entire area of rotation. If the bearing capacity is lower in some parts of the rotating area, in these areas the test load has to be defined accordingly.*

**The stability test has to be carried out so that the crane is on a stable base in the most unfavourable conditions defined by the manufacturer. All the ramps have to be accordant with the maximum inclinations defined by the manufacturer.*

** The goal of the test is to verify the standing stability of the unladen load crane installed on a vehicle. During the test loading one or more bearer feet may rotate or rise from the ground. In any case at least one of the parking brake casters has to stay in contact with the ground. The test loading must be carried out with an unladen vehicle without a driver.*

** The test should be considered acceptable if the test load remains in place without any sign of falling.*

** Installation company that determines standing stability:*

Installation company.

Date ***Signature***

5 WORKING WITH THE CRANE

5.1 GENERAL INFORMATION

The safe and effective use of the device requires good knowledge of the device and extensive practical experience. Each crane model has different trajectory, speed and characteristics, so even experienced users are encouraged to thoroughly acquaint themselves with the operation of the new crane before its actual commissioning.

5.1.1 Safety instructions

Please read and understand the operation, maintenance, and safety instructions before operating or servicing the cranes. Operation, maintenance and adjustment may only be carried out by people qualified for operating and servicing the specified device. Lack of information on the device's operation and characteristics can cause serious injury or death.

The user must always wear safety equipment such as a safety helmet, protective clothing, safety footwear, hearing protection, safety glasses and other protective equipment.

It is forbidden to use the crane unless the use and safety instructions have been studied!

** Always apply parking brakes for the time of loading. If necessary, place blocks in front of wheels.*

** Check that the rear mounting bracket has been locked to the vehicle with a chain*

** Stabilizer legs are operated from a valve attached to the base or from the control position by remote control.*

** Spread out the stabilizer legs as wide as possible to achieve good standing stability. If this is not possible, start loading with small loads.*

** Make sure that the ground under the stabilizer legs is strong enough. If necessary, use additional plates.*

** The stabilizer legs are fitted with lock valves, so they hold in case of a possible overload or hose failure. The stabilizer legs are prevented from turning by pin locking, if necessary. (For example, a stand-mounted crane is removed from the truck to its stabilizer legs). Pin locking cannot be used during working.*

** Please note that when the load increases, most of the weight goes to the stabilizer legs because the truck springs have been lightened by stabilizer legs. As a result, it is recommended to shorten the stabilizer legs in the mid of loading, in which case the weight shifts to the truck wheels.*

** Avoid loading on a sloping surface. If this is not possible, use extreme caution and lift small loads. When loading uphill, please remember that the pressure relief valve of reversing cylinders can become overloaded and the load can escape downhill and cause an incident.*

** The aggregate's standing stability is at its weakest when the load space is empty. When the aggregate begins to fall, lower the grapple immediately to the ground. Do not drop the load by opening the grapple.*

** Make sure that there are no people in the grapple's operation area and that you can see freely the entire operation area.*

5.2 THE CRANE'S OPERATING PRINCIPLE

In order to function the crane needs a drive unit and a hydraulic pump connected to it, as well as the necessary hydraulic equipment (such as an oil tank, filters, hydraulic pipes). All movements are hydraulic. Different functions (turning and lifting the boom, compressing the grab, etc.) are achieved by channelling pressurised oil with the hydraulic cylinder to the desired control valve. The crane operator can control a number of functions simultaneously, as required.

5.3 WORKING METHOD

5.3.1 Special Safety Instructions

- ***Never lift the load above people.***

** Grab the load carefully and always as close to its centre of gravity as possible. Do not exceed the max load indicated by the load table.*

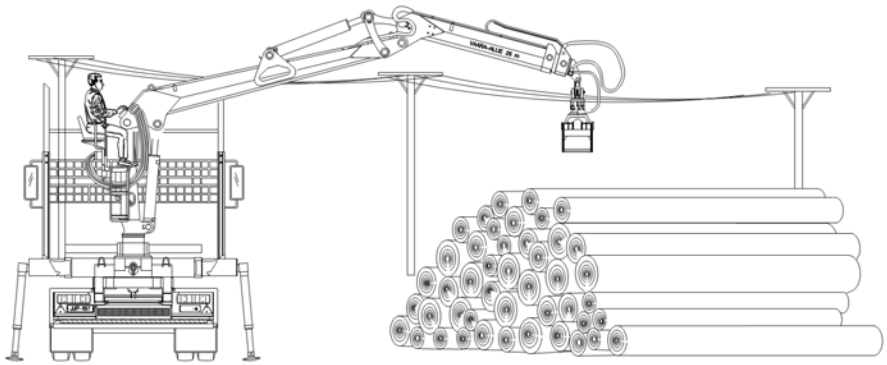
** It is not appropriate to raise loads with the telescopic boom's maximum reach, but is it better to lift them after having drawn them closer.*

** Avoid rapid lifting and lowering movements with the boom's maximum reach and turning motion before the load is in the air.*

** Do not drive the booms or swivel at the high speeds towards the end position.*

** Be careful when working in the vicinity of electrical conductors. Find out the safety distances from electric wiring and follow them. (Refer to the WARNING label).*

THE MINIMUM DISTANCE FROM ELECTRIC WIRES WITH VOLTAGE > 110 KV IS 5 M.



** Never leave the crane boom up without supervision!*

** When loading is complete, lower the crane firmly against the base and turn off the pump before driving off.*

** Use great caution when attaching or detaching the crane from a vehicle:*

DANGER OF TIPPING!

- ***Stabilizer legs must be prevented from turning with pin locking***
- ***The boom must be carefully set to the ground***
- ***The stabilizer surface must be sufficiently strong and steady***
- ***Make sure that there are no unauthorised persons in the danger zone***

** When you are planning to move the vehicle, make sure that there is nobody at the crane's control position.*

** It is prohibited to install further extensions to the crane without the manufacturer's permission.*

** Do not use the crane when it is broken*

** Use of the crane for towing is prohibited*

** Using the crane for lifting of persons is prohibited*

5.3.2 Practice

An experienced operator controls several crane movements simultaneously adjusting the various operating speeds as required. Naturally, the crane's movement speed is reduced when the oil stream is shared between several cylinders. An experienced operator handles the crane's control levers calmly and smoothly, avoiding twitches and sudden stops; thus working is safe and effective and unnecessary repairs are avoided. Considering the crane's sustainability it is preferable that an inexperienced driver adjusts the pump's output to be low, so it's easier for him/her to avoid sudden movements. We recommend exploring the crane's characteristics by lifting small weights at first.

5.4 CRANE COMMISSIONING

** Make sure that the vehicle's hydraulic system is cleaned before connecting the hoses to the crane.*

** The crane's hydraulic system has been cleaned and test-run at the factory.*

** Test loading has been performed at the factory according to SFS EN 12999.*

** Check that the hydraulic reservoir is filled, the shut-off valve on the pump's suction hose is open and the pressure and return filters are installed.*

** Always clean the quick connectors first. Always connect the return hose before the pressure hoses. Make sure that the quick connectors connect. <u>If the return hose remains accidentally disconnected, the control valve may become damaged.</u>*

** When starting the vehicle it must not be connected to hydraulic pressure.*

** Check that all the crane's control levers are in the middle position and that they also return to the middle position.*

**** Refer to the crane's daily inspection**.*

** Start the pump and adjust its output according to the crane's requirements (refer to specifications). You can get the information about the outputs for various speeds from the pump's supplier, if necessary.*

** If work is carried out at low temperature, let oil circulate for a while through the valve system with a low flow. Then slowly perform all the operating movements, back and forth, in order to make the gaskets more flexible before they receive maximum pressure. Rotate the rotator and run an empty grapple back and forth for heating of the hoses in the boom system and to prevent damage from the cold. The lowest recommended operating temperature is - 25° C, and the crane manufacturer's warranty does not cover the damage caused by the use in lower temperatures, -25° C or lower.*

** It should be noted that in lower temperatures hydraulic gaskets wear faster and the probability that hoses and steel structures become more susceptible and steel structure's probability of brittle fracture increases. When working in temperatures below - 25°C° it is preferable to lift smaller than normal loads in order to avoid unnecessary damage.*

** In low temperatures, the advantage is to equip the oil tank of the hydraulic system with a heater.*

** The manufacturer cannot guarantee the operation of the crane components at temperatures below -30° C. The components most sensitive to disturbances caused by the cold are the pilot control of the leg support valve and the priority valve controlling the flow to the leg support valve.*

** When starting the pump at a temperature of less than -30° C, disorder may occur in the priority valve controlling the flow to the stabilizer valve, wherein the priority valve remains at the position corresponding to its rest position and controls the output of the pump completely and not at all to the valve of the crane. If the equipment is equipped with a free circulation valve, disconnect it from the hydraulic circuit and start the pump again. Heat the oil, first by pumping the oil first with free circulation. If the system has a dual circuit, the second circuit heats the priority valve circulating in the same frame with it. Try again with the normal operation of the crane, when the oil is slightly warmed up. The priority valve can also be heated by driving the stabilizer valve functions back and forth with a minimum pump capacity.*

** When controlling the stabilizer valve from the control location of the crane, when the temperature is low, the leg support control can be switched on and off more slowly than normal or the pilot control does not respond at all. Heat the stabilizer leg valve by driving the stabilizer valve functions back and forth directly from the valve levers.*

** Similarly, in very warm conditions one should ensure that the hydraulic oil does not overheat (<75°C°). A too high oil temperature may cause damage to the gaskets and it also reduces oil life.*

- ***Notice the crane's trajectories and positions where it can run into the truck's cabinet or other structures.***

** Adjust the crane tower with the stabilizer legs to a position as vertical as possible.*

** Stop work immediately if you notice any impeding danger.*

** Work only in adequate lighting.*

5.5 EMERGENCY STOP MEASURES

*The crane's control system must be equipped with a **STOP**switch located in the crane's control position. It can be used to cut off crane's oil supply (e.g. by an electrically controlled valve) or, alternatively, the electric current to the pilot-operated control valve. Also the stopping of the drive unit is considered as a **STOPPING** - operation, if it can be done from the control position..*

5.5.1 Tipping hazard

- ***Immediately push the steering lever controlling the lifting boom completely open to the descending position.***
- ***Keep the lever continuously open until the load is on the ground. If you interrupt the descent, the sudden stop of the load will only further the fall.***
- ***In case of tipping danger do not lower the load with the outer boom, as there is a risk that the load reaches the cabin.***
- ***Do not jump out of the cabin, as you are at risk of remaining under the falling load, vehicle or crane.***
- ***No add-ons should be attached to the cabin frame by drilling or welding.***

5.5.2 Emergency stop in case of rupture of hoses

- ***In case of rupture of hoses press the STOP switch or stop the engine / pump!***

- ***Remove the spilled oil from the ground and take it to a waste oil collection point.***

6 ADDITIONAL INSTRUCTIONS

6.1 WAREHOUSING AND STORAGE

If the crane remains idle for a prolonged period of time, it is necessary to take the following steps:

** Clean the crane thoroughly for example with a pressure washer.*

- ***Washing the electrical components with a pressure washer is prohibited.***

** Lubricate all lubrication points after washing. This will eliminate any water that may have entered the bearings and prevent corrosion.*

** Oil the exposed cylinder arms and valve levers, for example, by spraying.*

** Check the turning device's oil level, if necessary. Let out a little oil from the drain plug; this removes any possible condensation water from the turning device.*

** Let out a little oil from the quick coupler. If the storage temperature increases (winter → summer), the oil volume increases and the hydraulic system becomes pressurised.*

** Touch up the spots where the paint is chipped or worn off.*

** Repair any detected faults and shortcomings to ensure the crane's proper functioning at commissioning.*

** Keep the crane's turning device in an upright position and support it enough to prevent tipping.*

** The crane should be kept away from direct sunlight, preferably in a shed.*

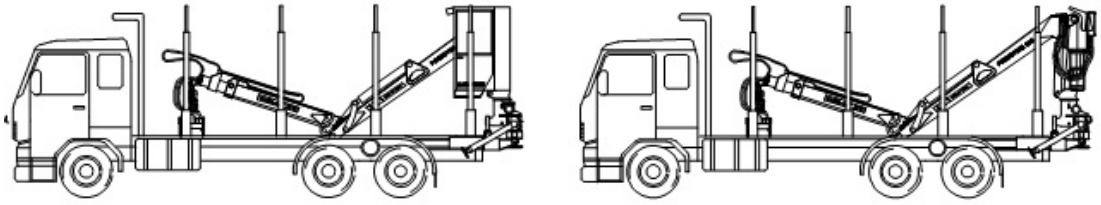
6.1.1 Start-up after storage

- *Clean the crane thoroughly*
- *Lubricate the grease points and check the turning device's oil*
- *Clean the cylinder rods from protective grease*
- *Tighten all bolts and nuts*
- *Check all controls and the functionality of safety equipment*
- *Read through this manual to recap*

6.2 ROAD TRAFFIC

** Obey all road traffic rules and regulations when driving on public roads.*

** When the load space is empty, lower the lifting boom's head to the bunk and set the closed grapple against the base.*



** When the load space is full, you might want to leave space for the boom to the centre, so that no part of the crane exceeds the allowable transport height.*

** Pull the stabilizer legs and the stabilizer leg releases to the transport position and lock them.*

** Switch off the hydraulic pump for the time of driving.*

** Tie the load carefully with load straps.*

** Removable rear mounting bracket has to be mechanically secured to the vehicle's body by a chain.*

** Do not exceed the permitted shaft weight and total weight and the transport dimensions.*

** Check the lights, reflectors, tire pressure, trailer coupling, etc. before departure.*

** Adapt the driving speed to fit the situation, so that the aggregate's controllability is maintained under all circumstances.*

** Pay attention to the aggregate's height when driving below power and telephone lines or bridges.*

6.3 REMOVAL OF A CRANE FROM USE

When the crane is used until the end of its life and repair is no longer justified, it should be removed from use so as not to cause unnecessary damage to the environment.

1. Take the crane to the scrap processing center, where the demolition takes place in a controlled fashion.

2. If you perform the demolition yourself:

- *Drain all the oil from the hydraulic system and the turning device and dispose the used oil to the collection point*
- *Disconnect the hydraulic hoses and take them to the rubber waste collection point*
- *Deliver the metal parts to the scrap collection center*

7 TROUBLESHOOTING

The operational failure table below shows the possible most common faults, their causes, and the measures that can be taken so the interference can be eliminated.

7.1.1 Safety instructions

** When carrying out repairs and measures to remove the cause of the failure, all the instructions issued on the crane operation and safety should be strictly adhered to.*

FAILURE	**POSSIBLE CAUSE OF THE FAILURE**	**MEASURE**
The crane does not move	- There is no oil in the tank - Pressure connection is not connected or is faulty - The pump does not build up pressure	- Add oil - Check the connection and replace a new quick coupler if necessary - Measure the pressure from the pressure end of the control valve , check the pump pressure relief valve
The crane moves a little bit, or is powerless	- Return connector is not connected or is faulty - The main release of the crane or pump pressure relief valve is faulty or dirty	- Check the connection, measure the return pressure - Measure the pressure from the pressure end of the control valve , if necessary replace the pressure relief valve
One option is powerless	- The spool specific pressure release valve is faulty or dirty	- Measure the pressure of the relevant operation and replace with a new pressure relief valve if necessary
The boom is lowered at normal load	- the pressure relief valve of the relevant operation is leaking - Cylinder seal is leaking - The valve spool is leaking	- Replace the pressure relief valve - The functionality falls under the load and the cylinder heats up when putting a load on it. - Replace the seals
The hydraulic system is heating up	- The pump is worn loose - Pump capacity too large for the valves in question - Too little oil in the hydraulic system	- Measure the pressure when the oil is hot. If necessary, replace the pump - Measure the return pressure, adjust the flow rate to less - Add oil
- The valve spools are sticky	- Overheated hydraulic oil - Impurities in the valve - The studs connecting the valve blocks are too tight or too loose	- See the previous item - Check whether the oil and filters are changed according to the recommendations - Check the tightening torques
The turning device body drains the oil	- Cylinder seal of the turning device is leaking - Too much grease in the turning device - The shaft seal is leaking	- If necessary, replace the seals (seals may leak a little oil go a little past, when the oils are very cold) - Tighten by turning the spring of the shaft seal, replace the shaft seal if necessary

8 MAINTENANCE INSTRUCTIONS

This part of the Maintenance Instructions will walk you through the routine maintenance and the necessary checks and adjustments.

8.1 SAFETY INSTRUCTIONS

- ***Washing the electrical components with a pressure washer is prohibited.***

**Disassembly of the crane or its parts, during the warranty period should be assigned to the manufacturer's authorized service person.*

** During the maintenance, repair or cleaning, the boom has to be supported against the base! Do not leave it pressured by hydraulics!*

** The pump has to be disconnected and the engine to be switched off if the maintenance procedure does not require the use of a crane.*

**Opening, tightening, etc., of the pressurized hydraulic is prohibited.*

** Caution should be exercised when removing hydraulic pipes and hoses ensuring that there is no hydraulic pressure left in the line when the power source is turned off.*

** When the hydraulic system is opened, air can access it, which can cause sudden, unpredictable movements in deployment of the crane.*

** Use adequate lifting capacity with the hoist and lifting aids handling the crane or its parts. Do not stand under the weight during lifting or work.*

** When working and servicing avoid skin contact with oil or lubricating greases. They contain solvents and additives that in repeated contact with skin may be harmful (drying and cracking of skin). Old dirty oil or grease is more dangerous than new. When processing of these materials, follow the instructions given by the manufacturers and the authorities.*

** If oil or lubrication grease have caused a skin rash, inflammation, or has come into contact with the eyes, contact the doctor immediately.*

** When handling oils and greases, use protection gloves, creams, glasses and clothing as needed.*

** Do not use oily or greasy clothing and do not store oily objects in your pockets.*

** Do not use lubrication oils or greases for cleaning your hands.*

** The waste oil released during the maintenance or repair must be submitted for appropriate handling.*

8.2 GENERAL MAINTENANCE INSTRUCTIONS

First familiarize yourself with the maintenance instructions, because improperly or incompletely performed maintenance can cause damage to the crane.

** The crane must be serviced periodically, to ensure safe and trouble-free operation.*

** KESLA crane maintenance tasks do not require any special tools that have not been supplied with the machine. Thus, the crane operator him/herself can perform almost all of the maintenance tasks.*

** The valves' pressure values should not be changed without the permission of the manufacturer due to the hydraulic circuit values. The valve adjustments and repairs should be performed by authorized service personnel.*

** The crane has been thoroughly tested and adjusted prior to shipping from the factory.*

** Do not use a malfunctioning crane, but repair even the smallest flaws and defects before they cause major damage* ***((see the daily inspection of the crane).***

** For easy maintenance, we have established a maintenance schedule for periodic inspections and maintenance procedures, and* ***the operational interference table*** *for fault localization.*

**The persons responsible for crane operation and maintenance need to be aware of these things.*

By following the maintenance instructions and by keeping in mind the absolute purity in the hydraulic installations, the crane works reliably and unnecessary interference is avoided.

8.3 DAILY INSPECTIONS

** Check the hydraulic oil and the rotating device's oil level and top up if necessary.*

** Lubricate the crane if necessary (see maintenance measures).*

** Visually inspect the crane's mounting screws, shaft mounts, hoses and any possible leaks.*

** Ensure the management and operation of the safety equipment by running the functions to their maximum and repair any defects immediately*

** Make sure that the* ***STOP****- switch is working.*

8.3.1 Hydraulic hoses and pipes

- Check that the hydraulic hoses do not have abrasions or bruises that may cause hose rupture.

- Check the hydraulic fittings and pipes for warps or cracks that can cause a sudden breakdown.

- The protections of hoses and movements in the various positions of the loader are checked.

8.3.2 Load-bearing steel structures and welding seams

- Review of steel structures and welding seams after the trial run, that there are no tears, cracks, or other permanent dangerous deformation.

- Check that no inappropriate alteration or repair welding has been made in the structures.

8.3.3 Shaft locks

- Check that the shaft locks are not loose or disconnected.

8.3.4 Hydraulic system

- Check if the changes endangering the safety have been made in the hydraulic system, such as the hoses are original and in their pressure class.

8.4 MAINTENANCE SCHEDULE

Maintenance object		**Measure**	**The frequency of maintenance/h**	**Note!**
General	1	Check of cylinders and hoses for leakage	10	Daily
	2	Fastenings of shafts and inspection of the fixing screws of the crane	10	Daily
	3	Inspection of the condition of hoses and hose connections	50	
	4	Cleaning and inspection of the condition of load-bearing structures	250	
Turning device	5	Lubrication of the bearings with a clamp	10	
	6	Tightening of the fixing screws	250	1200 Nm First 50 h
	7	Checking the oil level	10	
	8	Changing the oil	1000	11.2 l First 50 h
The boom	9	Lubrication of the bearings with a clamp	10	
	10	Inspection of the bearings of the boom	250	
	11	Inspection of the fastening of the guide components and shafts of the cylinders	250	Tighten if necessary
Extensions	12	Lubrication of the bearings with a clamp	10	
	13	Applying lubricant to the extension by brushing	50	
	14	Inspection of lateral clearings	50	Adjust if necessary
	15	Inspection of the vertical clearings	250	Adjust with a shim if necessary
	16	Tightening of the shafts of the bucket of the grabber	250	First 50 h
Chains	17	Chain lubrication	50	
	18	Inspection of the tightness of the chains and adjusting if necessary	50	
	19	Chain cleansing	1000	Changing if necessary
Control equipment	20	Lubrication of joints	50	
	21	Inspection of the fixing screws	250	Tighten if necessary
Rotator	22	Tightening of the bolts of the rotator body and flange	500	First 50 h
	23	Tightening of the fixing bolts of the grabber	500	First 50 h
The oil tank	24 22	Maintenance of the return filter and the breather cartridge Changing of the pressure filter	500 500	First 50 h First 50 h
The hydraulic system	23	Changing of the return filter	1000	First 50 h
	24	Changing of the hydraulic oil	1000	At least 2 times a year
Control cables	25	Lubrication	In icing conditions	At least once a month

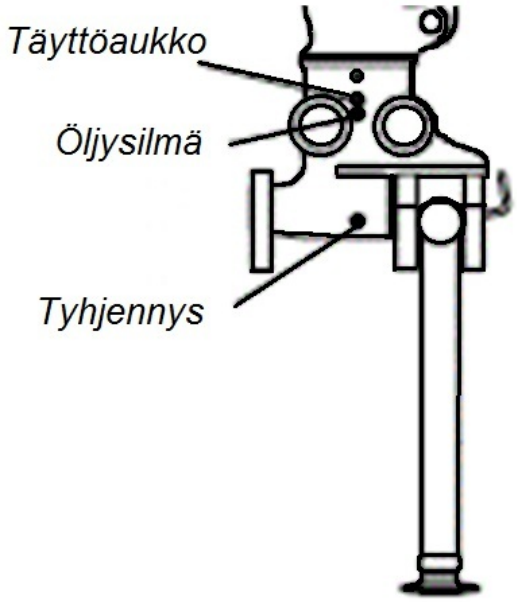
8.5 TURNING DEVICE

8.5.1 Lubrication of the turning device

- For lubrication a couple of squeezes with a grease gun is enough.

** The top bearing of the turning device (2 grease nipples) should be lubricated regularly.*

** The turning device is in other respects oil flooded. Check the oil level on the level surface through the oil eye. If necessary, add (hypoid oil SAE 80W/90).*



Täyttöaukko = Filling hole
Öljysilmä = Oil gauge
Tyhjennys = Draining

** The top pivot of the stabilizer has 2 grease nipples and in the front bar (in the swing) 1 grease nipple.*

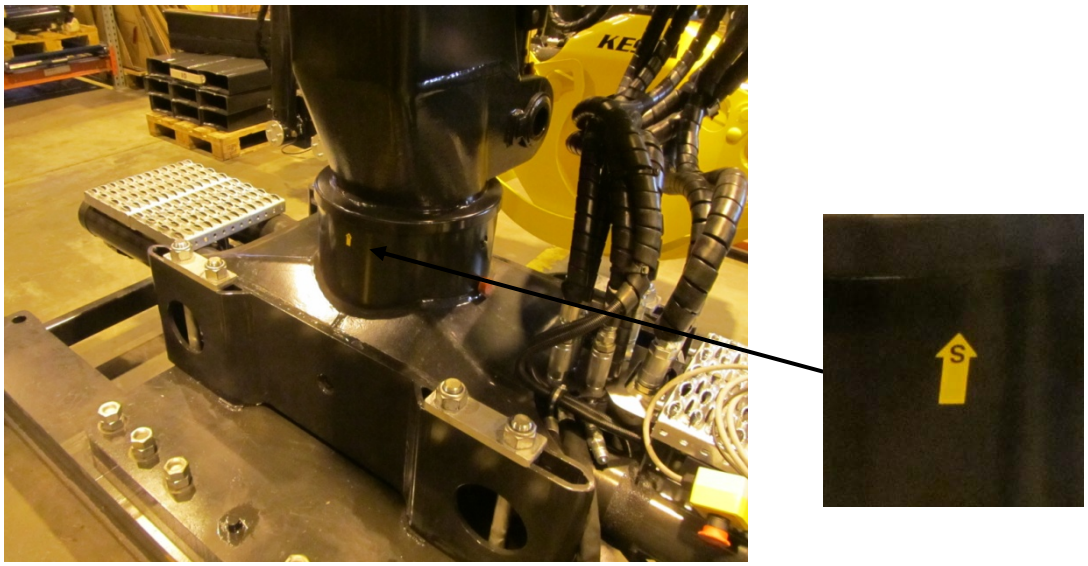
8.5.2 Positions of the turning device

Center positions of the turning device

Marked with points on the turning device. When the marks are aligned, the turning device rotates in both directions equally.

The extreme position of the turning device:

Marked with the label (3281523). Indicates the side to which the movement is stopped when the boom is at its extreme position. The label should always be installed to the opposite side from the center position markers of the turning device.



8.5.3 Opening of the turning device

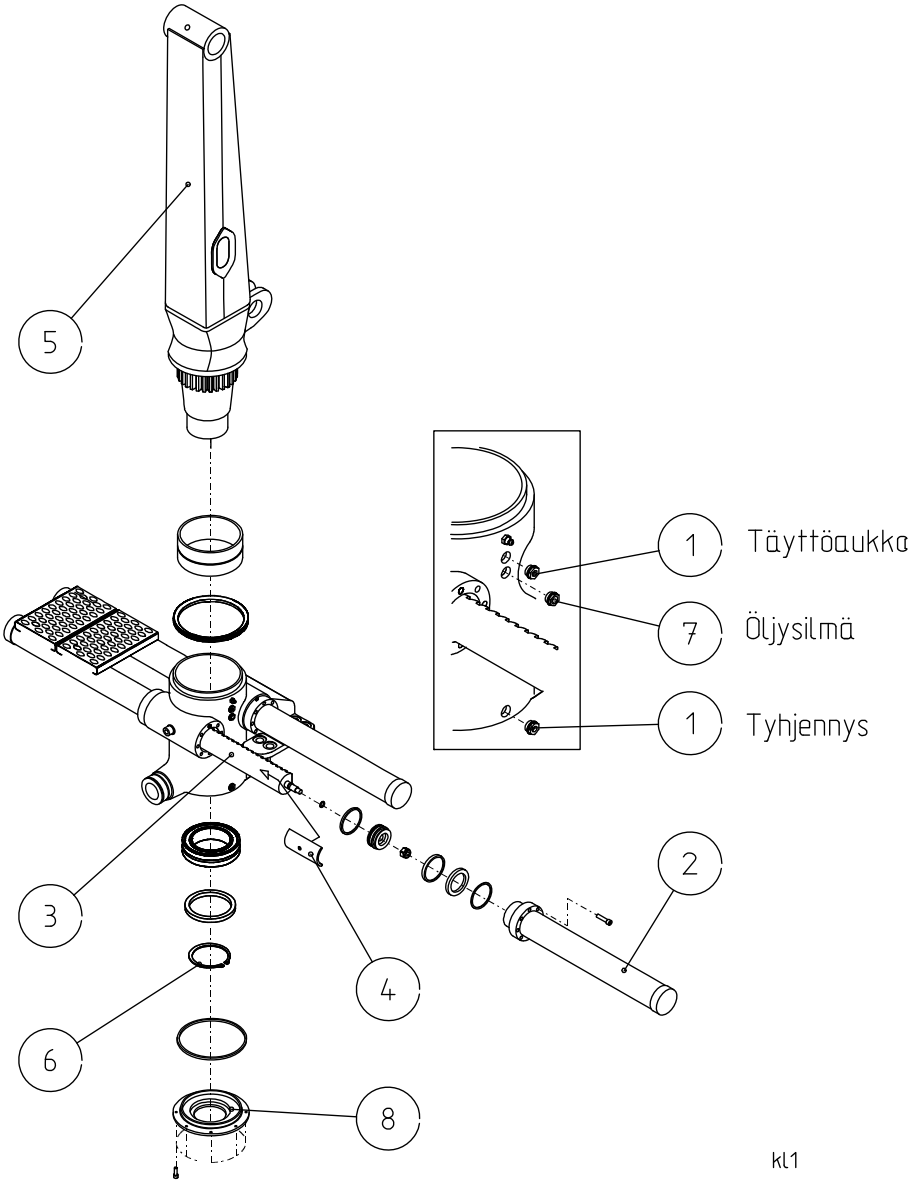
** Turn the boom to its central position.*

** Lower the oil of the turning device into the container by opening the drain plugs and the filler plugs (1).*

** Remove the cylinder pipes (2) and drain the oil in them into the container. The rack (3) and the support bearing of the rack (4) can be removed without lifting the column from its position.*

** Column (5) can be lifted off, when the bottom flange (8), the locking ring of the lower end (6) and the hoses passing through the columns are disconnected. The column can be lifted off without removing the tilt cylinders and the racks.*

** The assembly is done in reverse order, and finally the turning device is filled with the 80W90 hypoid oil up to the oil eye (7).*



8.6 THE BOOM

8.6.1 Lubrication of the lifting boom

- The bearing is lubricated by squeezing the grease in until it is forced out.

** The bearing pipe of the upper end of the turning columnhas one grease nipple.*

** The bearing pipe of the joint between the lifting and transfer boom has two grease nipples.*

** The bearing pipe of the joint in the lifting beam is lubricated from the grease nipple located below the boom.*

The Draw bar has three grease nipples.

** The joint bearings of the lifting and transfer cylinder (4) must be lubricated on a regular basis*

8.6.2 Lubrication of the transfer booms

** The rear sliding pads of the extension are lubricated from the grease nipple located on the transfer boom. In this case, the extensions must be retracted.*

**In a 2 - fractional model, the chain wheel (2) bearings are lubricated from the lubrication nipple at the end of the shaft (extensions must be retracted).*

** All the grease nipples of the crane can be lubricated at one time when the transfer boom is turned so the extensions inside under the lift boom are downwards. In this position, the inner surfaces of the extensions and the internal chain are lubricated through the rear end of the transfer boom.*

** Finally, the extensions are run completely out and top, bottom, and side surfaces of the extensions are lubricated or brushed with the lubrication grease.*

8.6.3 Opening of the transfer booms

1. The extensions are pushed out about 30 cm.

2. The extension cylinder from the transfer boom and the and hydraulic hoses are detached

3. All the slide parts are removed from the mouth of the transfer boom.

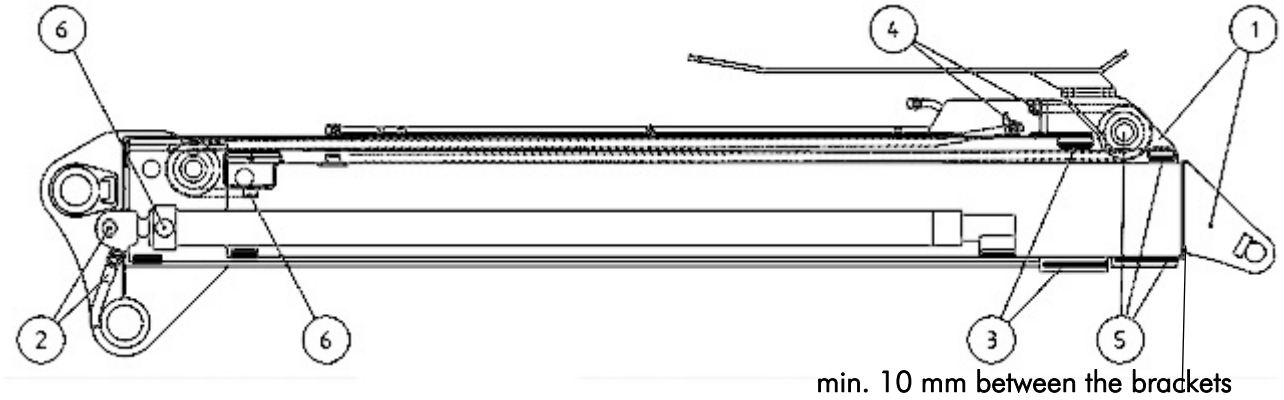
4. Tightening nuts of the chain couple are opened and the rear chain is threaded with fasteners in through the hole and lead out of the mouth hole of the transfer boom. At the same time the whole extension package is dragged out of the transfer boom.

5. The outer extension is discharged accordingly by removing all the sliding pads and chain roller from the mouth of the inner extension. The chain is guided through the opening of the roller out of the mouth orifice of the boom.

6. The cylinder of the extension and the tightening fork of the rear chain is removed and the extension is pulled out.

7. In a one-extension model points 1 to 3 will be performed.

8. The assembly is done in reverse order.



8.6.4 Adjustment of the tightening of the chains (two - extension models)

** Extensions are pushed completely out, and then pulled slightly inward, so that the visible chain loosens up.*

**Both chains of the chain couple are tightened to the same extent. A suitable tension is when the chain bends in the middle when pressed with a hand about 2-3 cm.*

** In practice, the chain inside the boom (pulling the extension) is loaded and stretches the most. Extensions are pulled in and adjusted into the interval of the lugs of the outer and the inner extension with nuts (4) ~ 10 mm.*

** Excessive tightening will wear out chains and chain wheel bearings.*

** Too loose chains can rupture when it gets on the edge of the chain wheel.*

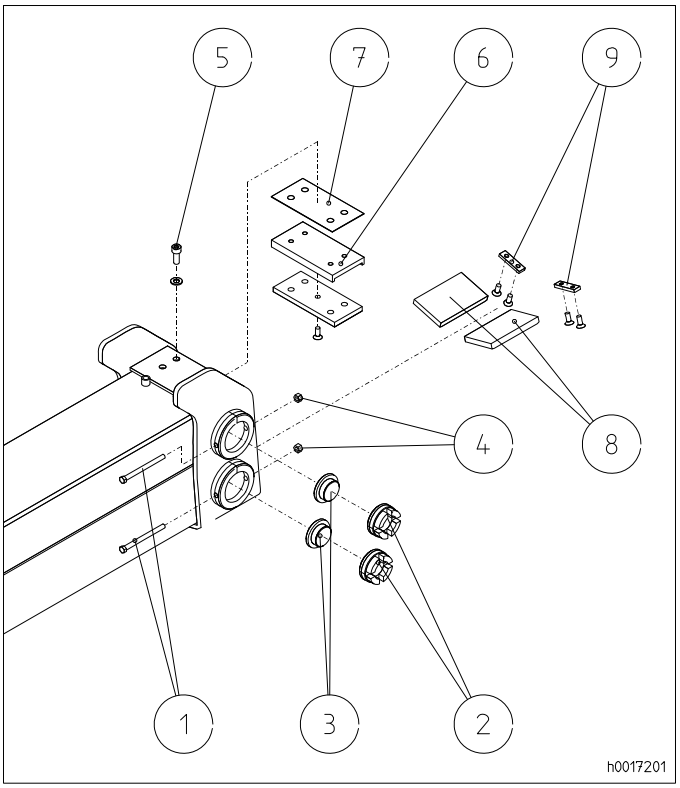
8.6.5 Adjustment of the lateral clearings

** Remove the locking screw (1) of the lateral sliding block.*

** Turn the bracket of the sliding block (2) clockwise equally from either side of the boom until the gap is eliminated.*

** If the gap is not eliminated by turning the bracket the sliding block (3) has worn out and has to be replaced.*

** Open the bracket (2) to the extent that the locking screw (1) goes to the previous slot and lock it with the nut (4).*



8.6.6 Adjustment of the vertical gap (one and two - extension models)

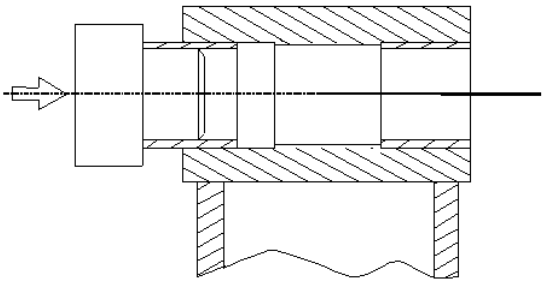
** Open the fastening screws (5).*

** Increase the shim (7) between the fastener (6) of the sliding block and top surface the boom as required (thickness: 1 or 2 mm).*

** The adjustment range runs out when the sliding blocks of the underside (8) are worn almost to the level of lock pieces (9) level, when the sliding blocks are replaced.*

- ***If the slide blocks are adjusted to be fully gapless, their wear accelerates and the movement of the extensions may be obstructed.***

8.6.7 Changing of the sleeve bearing



** In the boom has been used the so-called, thin shelled sleeve bearings, which are long-lived if properly lubricated.*

** When the bearing is worn so that the joint has clearly a significant gap, pull the shaft and the former bearings for example, by wedging it open at the seam.*

** At the installation of new bearings shall be used a suitable mandrel so that the end of the bearing is not damaged.*

** At the installation is taken into account that any grease holes are aligned.*

** Check the condition of the shaft and lubricate the new bearings with the grease in accordance with the recommendations before installation of the shaft.*

8.6.8 Adjustment of the grapple hanger brake

- The adjustment of the grapple hanger brake is reviewed after the first 20 hours of operation and thereafter every 250 hours

- Swing the crane's boom in the lateral direction so that the grapple swings its entire movement distance in the lateral direction

- Where the grappler makes more than two oscillations before stopping, the brake of the hanger needs to be adjusted

- The adjustment is done by rotating the adjusting screw of the brake block

- If the brake block friction surface thickness is less than 2 mm, the friction block needs to be replaced.

- Avoid grease ending up on the friction surface when removing the friction block.

8.7 THE HYDRAULIC SYSTEM

** In order to function, the crane needs the hydraulic system, which includes a prime mover, a pump, an oil tank, filters and other necessary hydraulic equipment.*

** When replacing the hydraulic system components such as hoses, couplings, gaskets, etc., the smooth and safe operation is ensured best when using original KESLA spare parts.*

**** For the crane's hydraulic system should be chosen a suitable oil, which must be handled and maintained properly.***

** In the hydraulic system the oil operates as a force transducer and as a lubricant.*

** The use of high quality oil is the first prerequisite for the proper functioning of the crane.*

** The hydraulic system, to which the crane is connected to, has to definitely be clean. The system is to be equipped with a pressure filter and a return filter.*

** The system must also have a breather filter. This is to prevent large dirt particles from entering the hydraulic oil. Despite the breather filter dirt particles access the oil tank along with the air absorbed into it.*

** Foreign particles are dangerous because the pump and valves operate with minimal clearances.*

**Due to the temperature fluctuations hydraulic system condenses water. Water can cause operating problems, especially in the winter. As a result, the oil is changed often enough, according to maintenance recommendations, or at least two times per year; in spring and in autumn.*

** Change the filters often enough, according to the maintenance recommendations as well as always when changing the oil.*

** The oil tank can be cleaned with petrol or white spirit (not with fuel oil).*

8.7.1 Requirements set for a good hydraulic oil

**The solidification temperature must be less than -50°C.*

** The recommended hydraulic oil viscosity is 20-30 mm2/s*

** Note the effect of temperature to the oil viscosity.*

**** The viscosity must not sink below 10 mm2/s.***

** Hydraulic oil must contain the necessary additives for lubricating ability, anti-corrosion and foaming prevention purposes.*

** The oil must be suitable for the crane sealing materials. (Do not use engine oil in the hydraulic system).*

** Even the new hydraulic oil contains dirt particles, which due to their size can cause interference.*

8.7.2 Impurities in oil

** Oil storage and transport containers will increase the dirt.*

**Due to wear and tear of components crane operations generate metal and other particles that come in the hydraulic system.*

** When repairing the crane the dirt gets into the system.*

** Upon component damage large quantities of impurities at the time may get into the cycle.*

** Impurities in the hydraulic oil cause components to wear faster than normal, temporary failures, such as blockages in the oil channels or jamming of the valve stems, and, at worst, component damage.*

8.7.3 Avoid any impurities in the oil

** Do not store oil containers outdoors, water may condensate in the oil.*

** Keep the oil in closed containers of the manufacturer. Aim to get the oil from the vessel directly into the tank.*

** When handling the oil, use clean containers. Also, caps, funnels, strainers, and filler openings must be clean.*

** Clean the place to be repaired and its surrounding area before starting work. Once you have opened the hydraulic system, be sure that nearby no grinding and welding work may be done. Keep your job, your hands and tools clean. Use the correct tools.*

** Avoid repair of the hydraulic system outdoors and in dusty conditions.*

** Try to locate the fault as well; there is no need to open the system too much.*

** Keep the disassembled parts and the repair place well protected.*

** Keep the spare parts in their containers until the time of installation.*

** Clean the filters and replace the filter cartridges according to the maintenance instructions*

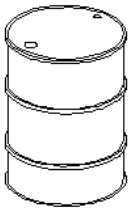
** Hydraulic hoses and pipes are blown and, if necessary washed clean before installation. For washing of the parts is used petrol or white spirit.*

** Use only high quality and the correct viscosity oils of well-known manufacturers.*

8.7.4 Biodegradable hydraulic oils

** In place of normal hydraulic oil have been developed rapidly biodegradable oils in nature, in which case the side effects in the event of the oil spill will also be reduced. Several forest companies require use of the above oils in their machines.*

** Normal oils cannot be directly replaced with any biodegradable oil without making any changes hydraulic equipment (e.g., pump seals, hoses).*



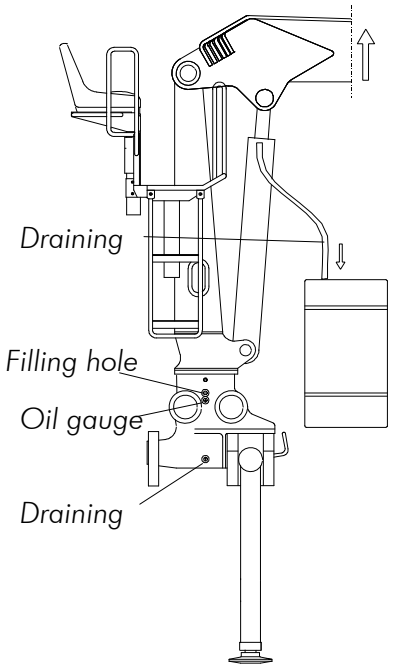
** Biodegradable oils are divided into three main categories:*

1. *Synthetic hydraulic oils based on esters (HEE)*
2. *Synthetic hydraulic oils based on polyglycols (HEPG)*
3. *Hydraulic oils based on vegetable oils (HETG) e.g. rapeseed oils*

- ***The use of HETG oils is prohibited in Kesla products!***
- ***Before you switch to using biodegradable oil, choose oil that is the most suitable type of oil with the oil seller and determine the suitability of the oil for pump seals and other hydraulic components.***

8.7.5 Oil change of the hydraulic system

** The oil of the hydraulic system is changed in the spring and in the fall or in every 1000 hours. Oil capacity of the crane is the smallest, if the arms of all the hydraulic cylinders are retracted. Then the oil tank is drained to be empty and cleaned as necessary and the filter cartridges are replaced. The oil tank is filled to the upper mark with hydraulic oil (see oils and lubricants). If the oil has been very dirty, you may want to empty cylinders separately. It is done by removing the hose on the rod side and by putting it in the waste oil container. Then the cylinder rod is driven out and the hose is attached back.*



** The oil of the turning device is changed once a year and the water removal is done 2 times a year. The oil level is checked from the oil eye, the oil is changed by opening the drain plug and the fill plug. The crane should be tilted in the direction of the drain plug. When all the oil has drained, the drain plug is attached and the turning device is filled with the hypoid oil to the top of the oil eye (see oils and lubricants). WASTE OIL MUST ALWAYS BE DRAINED INTO THE CONTAINER AND SUBMITTED FOR FURTHER HANDLING*

8.7.6 Performance of oil change

- The lifting, transfer, extension boom and the grapple cylinder are pushed all the way out.

- Remove the hoses of the rod side of the cylinder from the cylinders and the return hose from the hydraulic system. The quick connector that may be in the return hose is removed or a loose counterpart is installed in the quick connector so that the return line would be open.

- The rod side hose ends of the return hose and lifting cylinder are placed in the waste oil container.

- The cylinders are pushed in.

- The boom grapple swings are emptied by turning both of them by hand a few times from one extreme position to another.

- The rest of the hoses are disconnected from the cylinders. Clean oil is pumped through each hose line until the dirty oil has been removed.

- The hoses are installed and the cylinders are aired by running each motion in turn a few times from one extreme position to another.

- Use great caution, since the air in the system can lead to sudden movements of the crane.

- Execute the next oil change like after the first installation.

8.8 PRESSURE MEASUREMENT

⚠ WARNING	
	DANGER OF High-pressure liquid jets! • **High-pressure jets of oil can shoot out of faulty hydraulic hoses and cause serious injury when coming in contact with skin.** • **Never try to locate a leak by palpating.** • **If the system has pressure accumulators, they must be depressurised before maintenance procedures!**

** Be careful when performing hydraulic connections. High pressure hydraulic oil shower can cause serious injury.*

8.8.1 Measurement

Hydraulic system pressure is measured as follows:

- warm the hydraulic system to normal operating temperature

- adjust the engine rotating speed in such a way that the flow in the hydraulic system is 30 l / min.

- Squeeze the grapple completely shut

- Keep the flow still connected to the grapple cylinder, even if the grapple is already squeezed fully shut.

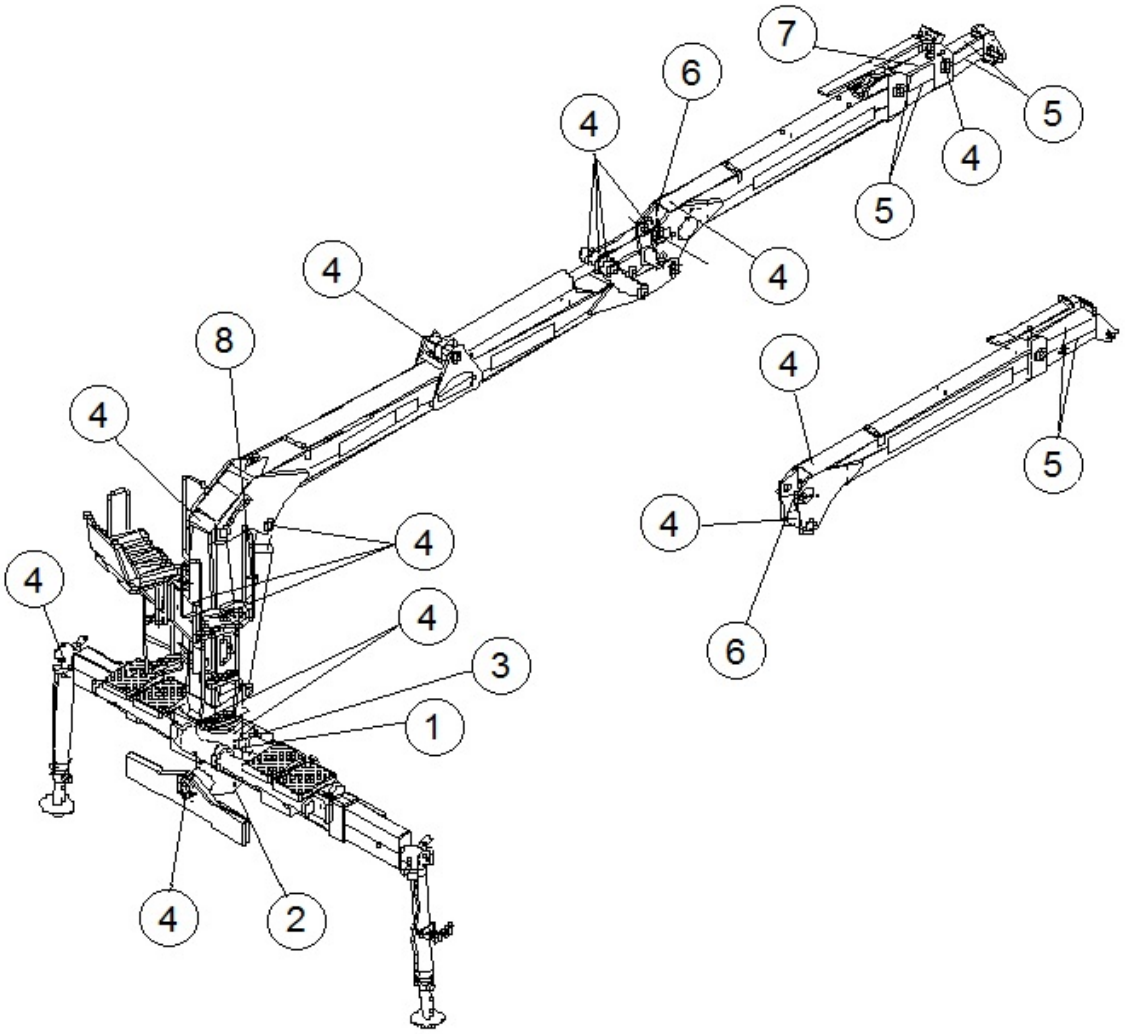
- Read the system pressure to P2 connector from the connected pressure gauge

- release the valve levers to the center position and read the free flow pressure

9 LUBRICATION

The provided lubrication intervals are valid when the crane operates with a normal load under normal operating conditions. Shorten the lubrication interval if the crane is heavily loaded or when the working conditions are unfavorable, such as with sand, dust, mud, etc.

9.1 LUBRICATION TARGETS



- ***Use molybdenum-rich grease in joint bearings and in the slide bearings of the booms (~ 2%). in other locations general grease is suitable.***
- ***Shorten the lubrication interval, where the working conditions are particularly unfavorable, for example. dusty.***

LUBRICATION POINTS:

Reference	***Lubrication points***	***Units***	***Measure***	***Lubrication intervals/h***
1	*Turning device, oil eye*	*1*	*Inspection*	*10*
2	*Turning device, the lower plug*	*1*	*Drain, drain the water twice a year*	*1000*
3	*Turning device, the upper plug*	*1*	*Filling, adding if necessary*	*1000*
4	*Joint and plain bearings*	*20/22*	*Greasing by press*	*10*
5	*The extensions of the external surfaces of the*	*1/2*	*Grease / oil*	*50 (SAE 10W50)*
6	*Internal surfaces of the extensions*	*1/2*	*Grease / oil*	*50 (SAE 10W50)*
7	*Chains (2-extensions)*	*2*	*Grease / oil*	*50 (SAE 10W50)*
8	*Chassis cables*	*4/5*	*Lubrication in icing conditions*	*At least once a month*

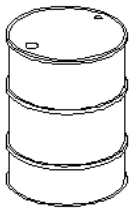
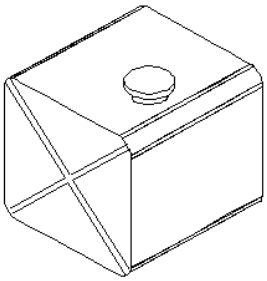
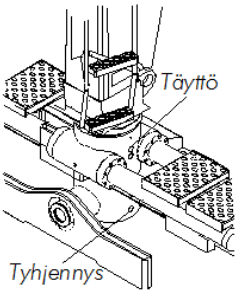
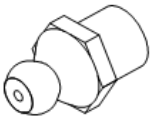
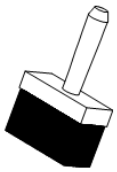
Lubrication of the chassis cables

** Lubricant coolant-water mixture 50% / 50%*

** The plug in the mounting sleeve of the top end of the cable is opened and from it coolant mixture is poured into the cable. Alternatively, the entire cable can be disconnected.*

9.1.1 Oils and Lubricants

The table below sets forth certain hydraulic oils, lubricating oils and greases, which are suitable for use in a crane.

Oil Brand	Hydraulic system		Turning device	The grease nipples
	 summer	winter		 The sliding surfaces Chains 
ESSO	UNIVIS N 46	UNIVIS N 32.22	GEAR OIL GX 80W/90	MULTIPURPOSE GR MOLY
MOBIL	DTE 16	DTE 15.13	MOBILUDE HD 80W-90	MOBILUX EP 2, MOBIL GREASE MP, SPECIAL
SHELL	TELLUS OIL T / TX 46	TELLUS OIL T / TX 32.22	SPIRAX AX 80W/90	RETINAX EPX 2 RETINAX EP 2
TEBOIL	HYDRAULI OIL 46	HYDRAULI OIL 32.22	HYPOID 80W/90	MULTIPURPOSE EP, MDS
NESTE	HYDRAULI 46	MULTIHY-DRAULI 22, SUPER 32	HYPOIDI MP 80W/90	MP GREASE, MOLYGREASE

** When starting a machine the pump manufacturer's instructions for the cold start must be complied with.*

** If the oil temperature does not rise above 70°C in the summer, winter oil can be used all year round.*

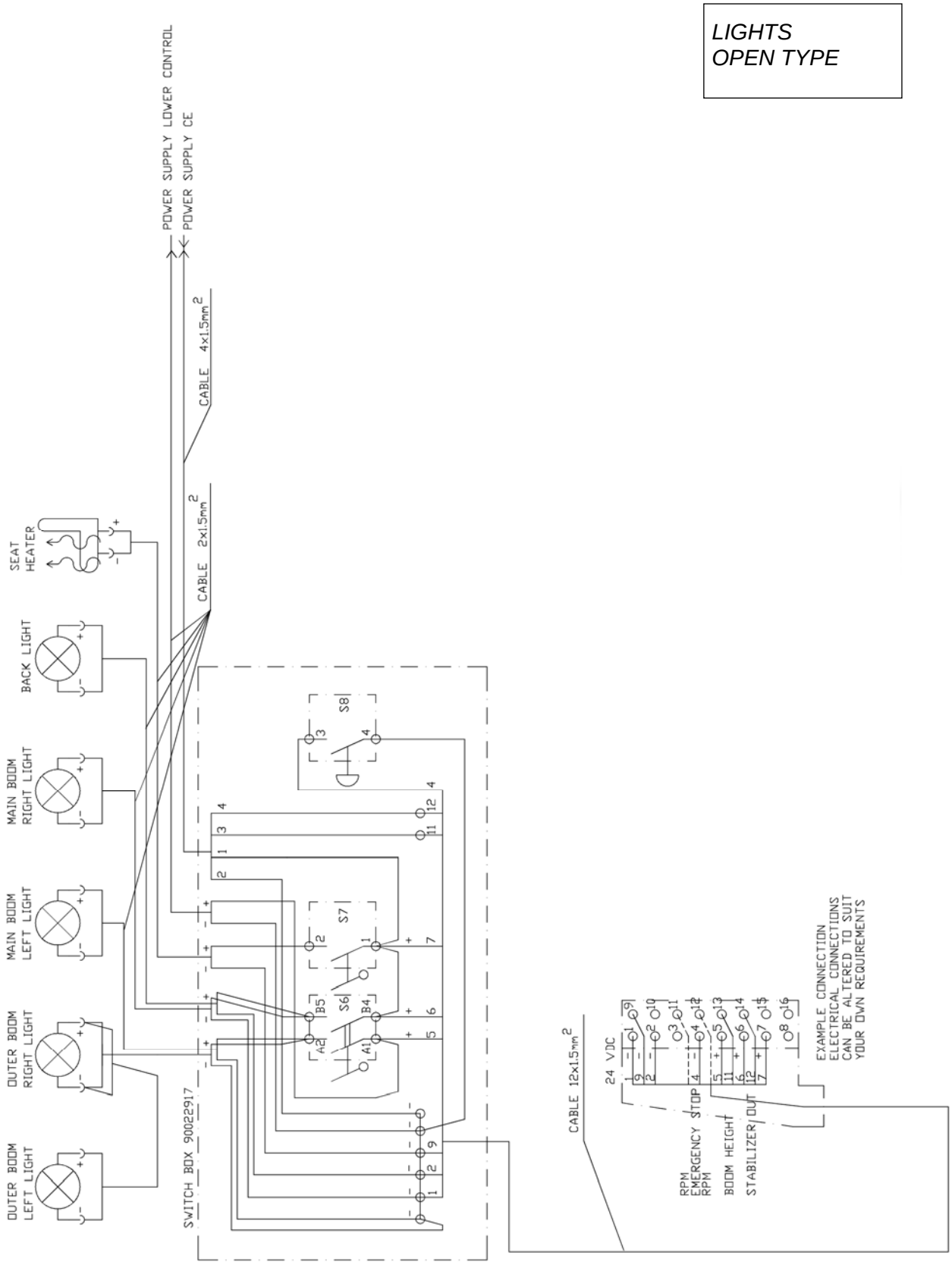
** In the factory the crane is filled with this oil: TEBOIL ECO 46*

** On the choice of hydraulic oil, however, follow primarily the recommendations of the manufacturer of the forwarder or the supplier of the hydraulic system.*

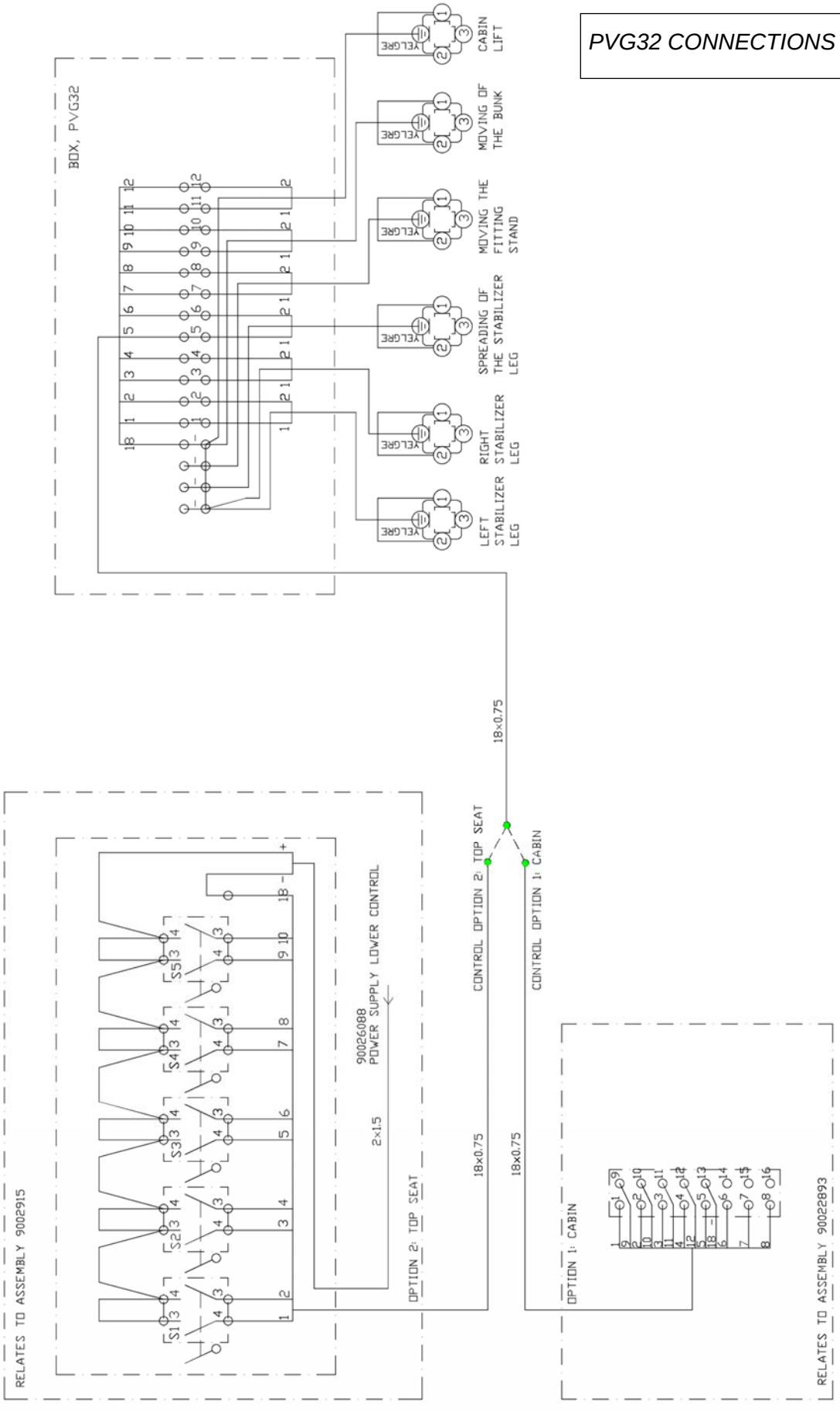
** Crane oil capacity is approximately 50 l depending on the size, so when changing the oil a considerable amount of oil remains unchanged, because the compatibility of the changed and prefilled oil should be taken into account.*

10 ELECTRICAL DIAGRAMS

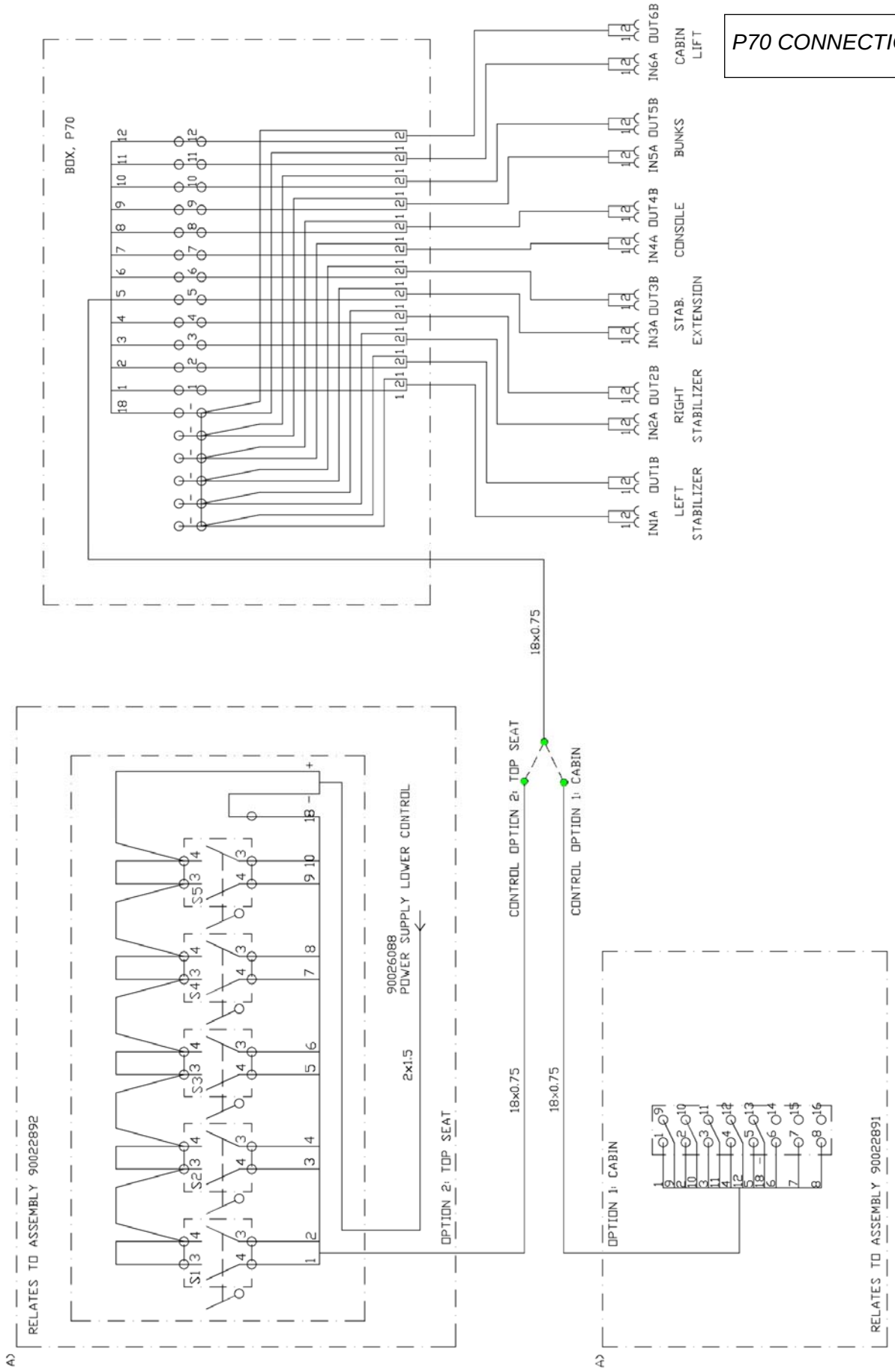
LIGHTS
OPEN TYPE



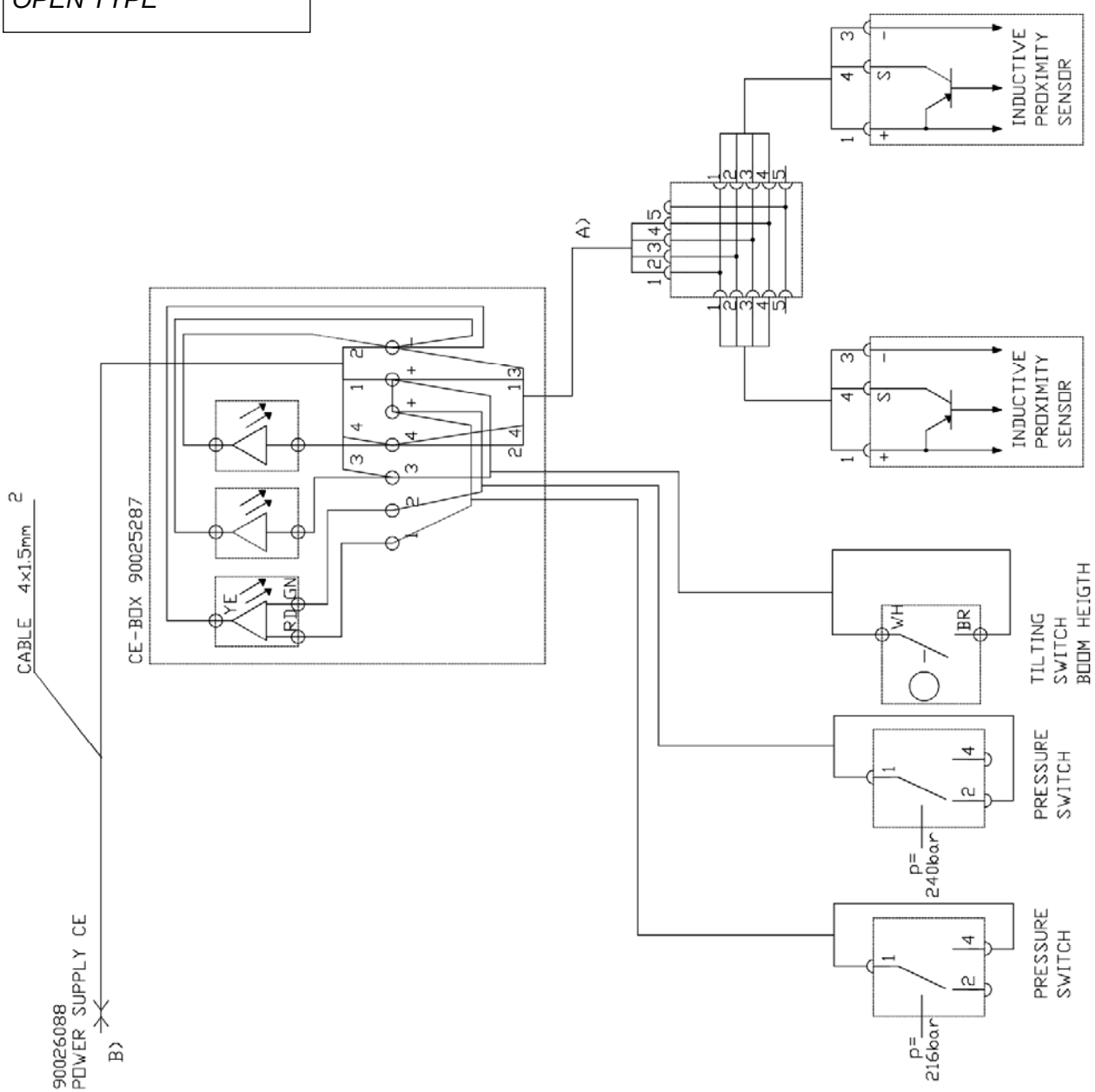
PVG32 CONNECTIONS



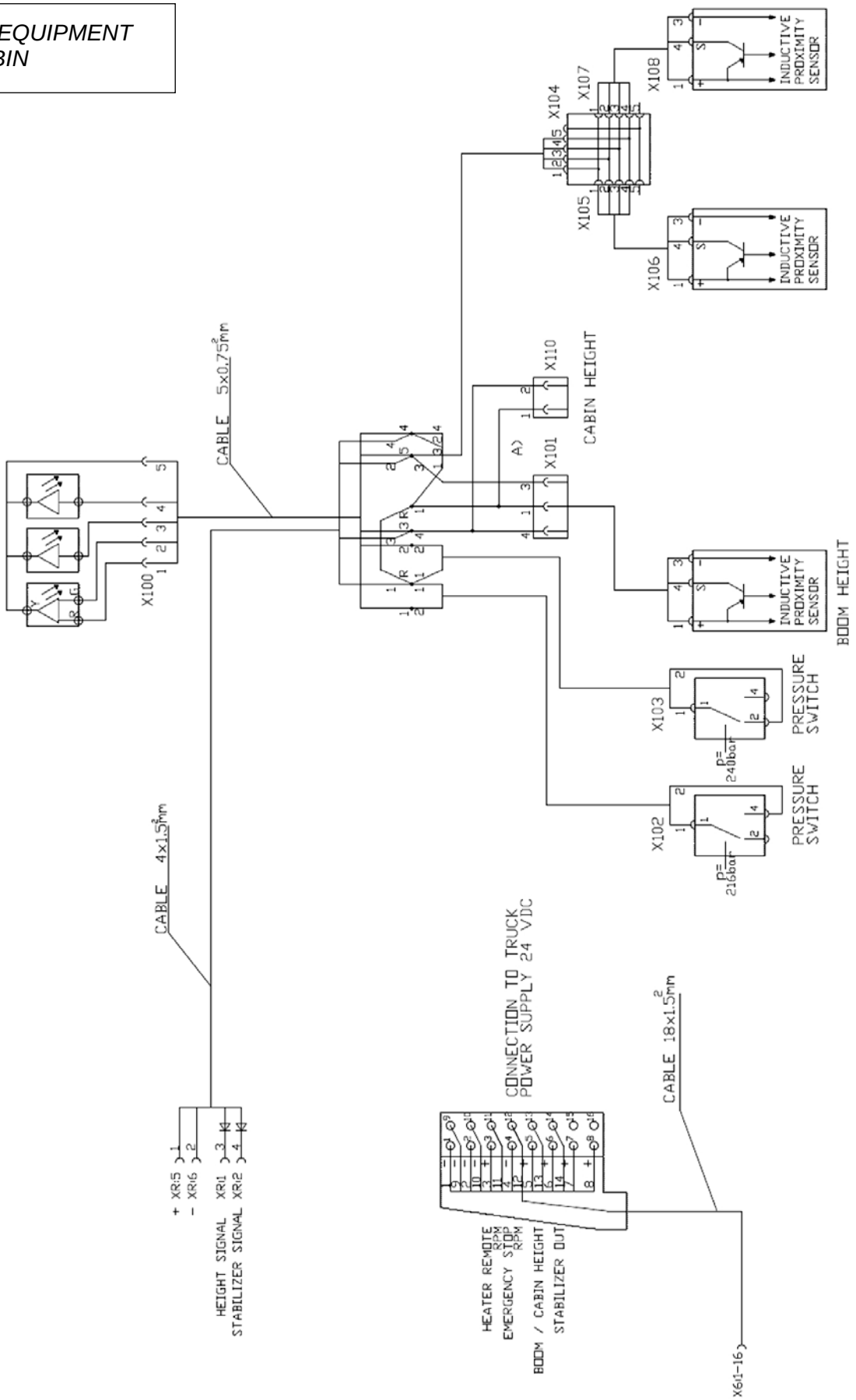
P70 CONNECTIONS



CE EQUIPMENT
OPEN TYPE



CE EQUIPMENT
CABIN



10.1 POWER SUPPLY CABLE CONNECTIONS

Wire	Cabin NT	High seat CE equipment	High seat CE Comfort
1	GND	GND	+24VDC
2	GND	GND	+24VDC
3	Heater remote (+)	Not used	+24VDC
4	Emergency stop (-)	Emergency stop (-)	GND
5	+24VDC	+24VDC	GND
6	+24VDC	+24VDC	GND
7	+24VDC	+24VDC	Not used
8	+24VDC	Not used	Truck rpm increase
9	GND	GND	Truck rpm decrease
10	GND	Not used	Supply for rpm and motor start / stop -switches
11	Truck rpm (+)	CE boom height warning (+)	Motor start
12	Truck rpm (-)	CE Stabilizers out warning (+)	Motor stop
13	CE boom / cabin height warning (+)		Not used
14	CE Stabilizers out warning (+)		Optional switch (+)
15	Not used		Emergency stop (-)
16	Not used		CE boom height warning (+)
17	Not used		+24VDC for CE sensors
18	Not used		CE Stabilizers out warning (+)
Recommended external fuse	40A	30A	30A

Last wire in supply cable is yellow-green!

11 APPENDIXES

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11.1 SPECIFICATIONS

The crane's specifications reveal its structural and functional dimensions, lifting capacity and pressure values

SPECIFICATIONS			KESLA 2012	KESLA 2012T
Lifting moment		kNm	125	119
Reach		mm	8050	9650
Turning moment, br		kNm	25,0	
Turning angle		°	415°	
Stroke of boom extension		mm	1600	2 x 1.600
Weight with control unit and stabilizers. Less oil, grapple and rotator.		kg	2440	2550
Height		mm	2220	
Transport width		mm	2500	
Pump recommendation - working pressure - flow - power input	 1 circuit 2 circuits 1 circuit 2 circuits	 MPa (bar) l/min l/min kW kW	 24.0 (240) 80 - 140 (H170) 2 x 70 - 120 (H170) 30 - 56 50 - 96	
Manufacturer's specifications are indicative and subject to change				

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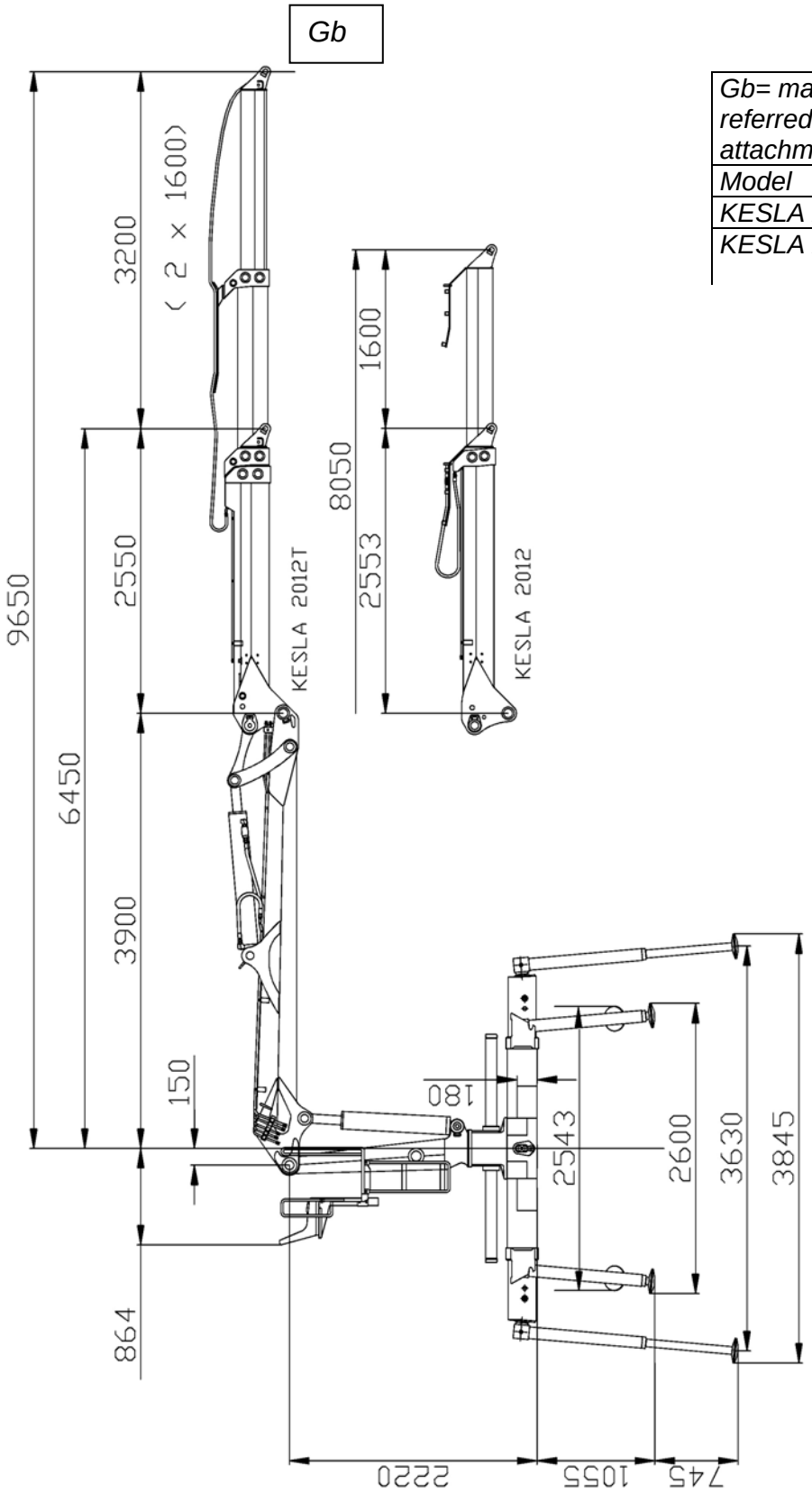
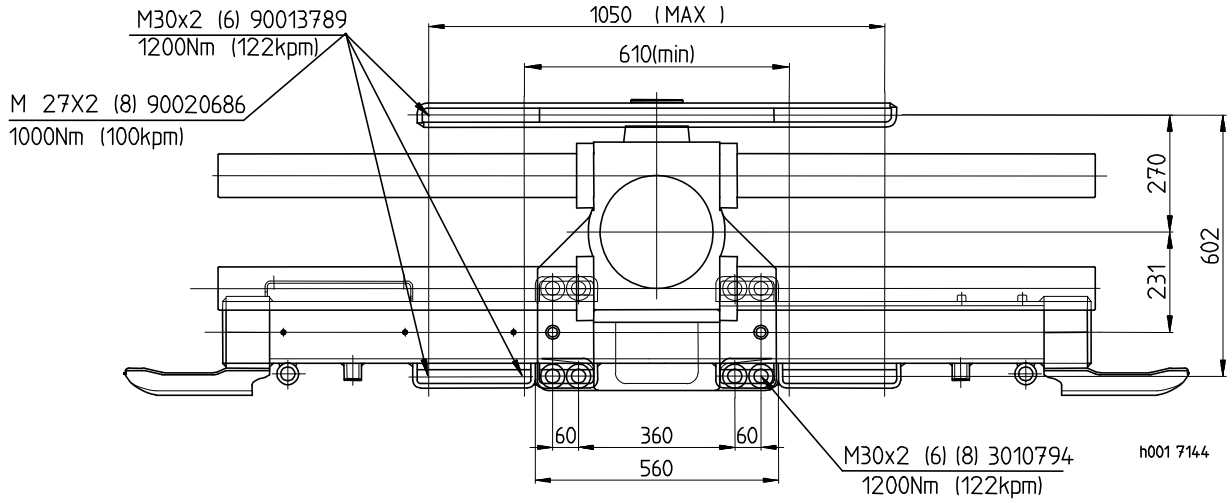
PRIORITIES AND TILT ANGLES

11.2 DIMENSION DRAWING



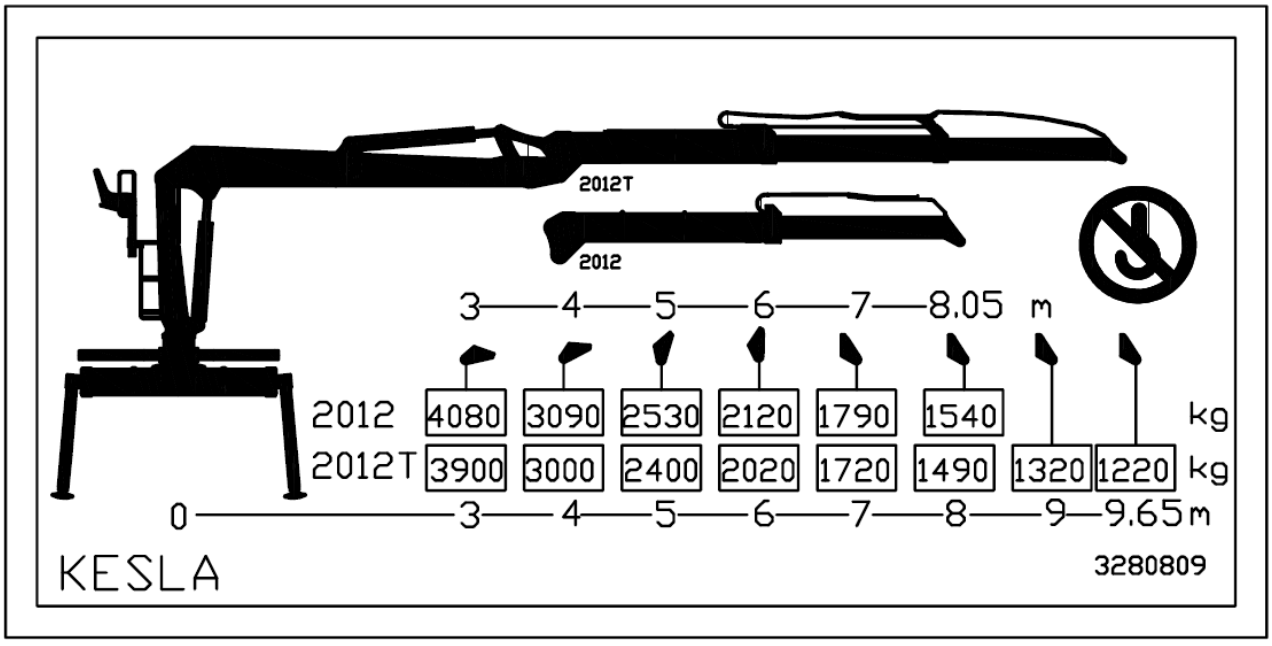
Gb= mass of the boom system referred to be point of load attachment.	
Model	*Kg*
KESLA 2012	*360*
KESLA 2012T	*410*

11.3 MOUNTING DIMENSIONS

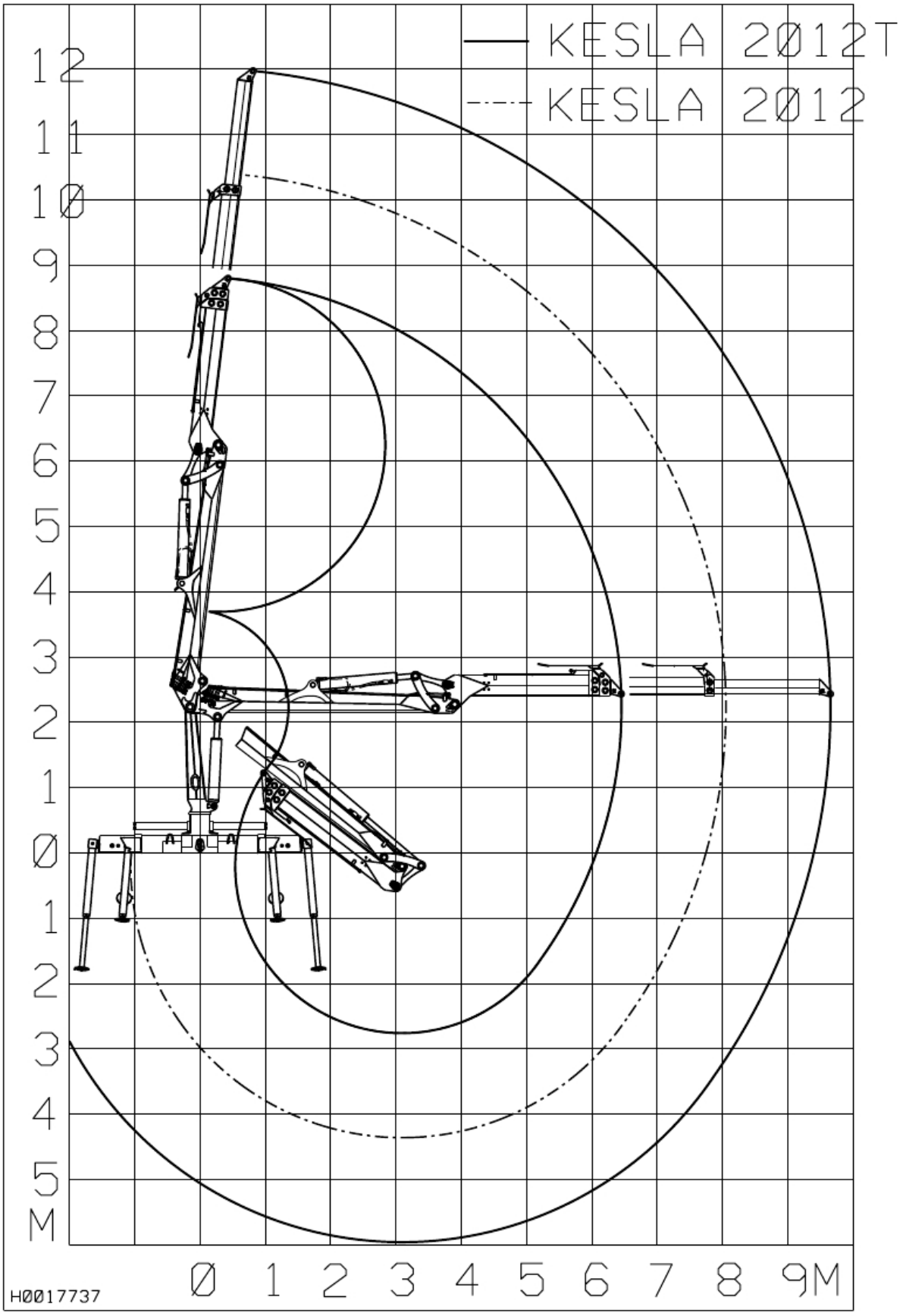


11.4 PERMITTED LIFTING VALUES

The load plate is located in the control position and indicates the maximum load with different lifting reaches.



11.5 OUTREACH DIAGRAM



11.6 TIGHTENING TORQUES

KESLA 2012, 2012T

Description	Partnumber	Bolt / thread	Nm (kpm)
Fitting of crane	9001 3950	M 30	1200 (122)
Fitting of slew mechanism	9001 3836	M 30	
Slewing cylinder	301 0601	M14x60, 12.9	200 (20)
Piston nut	301 0601	M14x60, 12.9	200 (20)
Lifting cylinder mouth piece	2831 7202	M129.5 x 2	**
Piston	28317201	M50x2	1200 (122)
Outer cylinder mouth piece	2831 7202	M129.5 x 2	**
Piston	2831 7201	M50x2	1200 (122)
Boom extension cyl., single ext., mouth piece	2858 6202	M64x2	**
Piston nut	302 0008	M20/UNF1" nyloc*	700 (71)
Boom extension cyl., double ext., mouth piece	2858 1202	M74x2	**
Piston nut	302 0041	M30x2, nyloc*	700 (71)
Stabiliser leg cyl., mouth piece	2838 2202	M104x2	**
Piston nut	302 0119	M55x2, KM11	200 (20)
Widening cyl. of stabiliser leg	2833 7202	M55x2	700 (71)
Piston nut	302 0026	M24, nyloc*	700 (71)
Fitting of controls Control valve blocks	130 CF, H170 CF	M12	60 (6)
Fitting of hydraulic pipes		M10***	40 (4)

** Replace with a new nyloc nut, if the previous is opened*

*** Screw tight and secure with a locking screw*

**** Secure with locking fluid, for example LOCTITE 242 or equivalent*

11.7 WARRANTY CERTIFICATE

_____ / _____ 20 _____

SERIAL NUMBER _____

VENDOR: _____

11.8 CUSTOMER FEEDBACK

In order to further develop our operations we would very much appreciate if you'd send us your feedback about a KESLA product or customer service by the form below.

Customer name:

Street address:

Postal code / city:

Telephone number:

E-mail address:

Product: *Serial number:*

Vendor: *Purchase date:*

	Excellent	*Good*	*Passable*	*Bad*
Quality of our operation:				
Quality of our products:				
Price competitiveness of our products:				
Customer service / transaction with us:				
Dealing with the distributor:				

Other feedback:

	Yes	*No*
I want to be contacted:		

Please send the feedback to the following address:
Kesla Oyj / Customer Feedback
Kuurnankatu 24
80100 Joensuu
or
FAX No. : +35813 6100523
or
as an e-mail attachment to: sales@kesla.com

You can also give feedback with the contact form on our website www.kesla.fi or return the form to the nearest dealer.