

OPERATION, MAINTENANCE AND SPARE PARTS MANUAL

HYDRAULIC CRANE FARMI 4670



**READ THIS OPERATION AND MAINTENANCE MANUAL CAREFULLY
BEFORE USING THE MACHINE**

FARMI[®]
FOREST

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FARMI 4670

WARNING SYMBOLS IN THIS MANUAL



- **imminent danger which could cause serious personal injury or death**



- **danger which could cause personal injury**



- **conditions or misuse that could damage equipment or machinery**

NOTE!

- **reminders, such as for performing checks or carrying out maintenance or repair procedures**

INTRODUCTION

This manual includes the information and maintenance instructions required for operating the machine in the optimal manner.

Although you have experience in using this kind of machinery, read the operation and maintenance instructions carefully since they include information enabling efficient and safe operation. Regular maintenance is the best way to guarantee the efficient and economical performance of the machine.



Each and every operator must read, understand, and follow all safety instructions and procedures.

CUSTOMER FEEDBACK

We are happy to receive your opinions and suggestions for improvements by mail, fax or e-mail. All implemented suggestions for improvements will be rewarded.



EC DECLARATION OF CONFORMITY

Manufacturer:

Farmi Forest Corporation
Ahmolantie 6, FIN-74510 IISALMI, Finland

Person authorized to compile the technical documentation:

Name: Heikki Sirviö
Address: Ahmolantie 6, FIN-74510 IISALMI, Finland

Commercial name:

Farmi

Machine denomination:

Hydraulic crane

Machine type:

FARMI 4670

Machine series number:

Herewith, we declare that the machine brought into circulation conforms with the pertinent requirements of the Machinery Directive 2006/42/EC and the EMC Directive (directive relating to electromagnetic compatibility) 2004/108/EC.

The following harmonized standards have been applied for the conceptual design of the machine:

EN ISO 12100, EN 12999, EN ISO 4413, EN60204-1, EN ISO 4254-1

Iisalmi
(Place)

13.02.2012
(date)


Juha Hallivuori

PRODUCT WARRANTY

Farmi provides a 12-months warranty on all Farmi products.

Register on our home page (www.farmiforest.fi) under FeedBack ("Product Registration" form) within 30 days after the receipt of the product to get full product warranty and additional information on your product. If it is not possible for you to register via internet, please register as follows: Complete the registration form on the last pages of this manual and return it to us within 30 days after the receipt of the product.

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When ordering spare parts, please indicate machines type from the machine plate, spare parts order number, description and quantity required.

Example. FARMI 4670, 54561477, slide bearing 1 pc

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GENERAL SAFETY INSTRUCTIONS

These safety instructions are meant for the owners of FARMI equipment, as well as those who operate, service or repair it.

The instructions help with:

- using the machine safely, appropriately and effectively.
- identifying, avoiding and preventing potentially dangerous situations.

The manufacturer supplies an instruction manual, which must always be available at the place of operation of the machine. Each user must read the safety, maintenance and operating instructions before operating the machine, and comply with these instructions at all times.



Ensure that every operator of the machine is familiar with the content of the instruction manual and situation-specific safety instructions, and has been suitably trained before operating the machine.

The machine complies with technical requirements and applicable safety regulations. However, incorrect use, maintenance or repair of the machine may cause risks.

In addition to the instruction manual, remember to comply with regulations of the local occupational health and safety authorities, and with your country's laws and decrees.

The manufacturer is not liable for damages caused by:

- incorrect, negligent or inappropriate use of the product.
- non-original spare parts.
- normal wear and tear.
- misuse caused by an untrained person's improper actions.
- alterations made without the manufacturer's permission.



Written authorization must be requested from the manufacturer for any alterations to the machine.

STARTING

- Familiarize yourself thoroughly with the use, operation and controls of the machine and its equipment before starting.
- Familiarize yourself with the capacities and limitations of the machine and its equipment.
- Do not use the machine unless you are completely familiar with its operation.
- Be aware of the machine's danger zones.
- During operation, prevent bystanders from entering the danger zone.
- Ensure that each operator has the necessary safety equipment, such as a helmet, safety goggles, work safety boots and suitable protective clothing.
- Never wear loose clothing around moving parts. Protect long hair!
- Ensure that work is carried out according to the stipulations of applicable occupational health and safety legislation.
- Before starting up or using the machine, ensure that it cannot cause a risk to other people or property.
- Perform a safety check on the machine before every use. If you observe any faults or deficiencies, repair the machine immediately.
- Before operating the machine, ensure that there are no foreign articles in it.
- Place the machine on a hard, level surface for operation. In the winter avoid working in slippery areas.
- Before mounting and using the machine, check the PTO drive shaft for correct condition and attachment.
- Never use a faulty or deficient machine.

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TRANSPORT

- Before driving with the machine, ensure the safe mounting of the machine. Make sure that the journals are seating correctly and that the pins are tight. Check the tension of the lower link stabilizers.
- Before driving with the machine, make sure that the required lamps and reflectors as well as the slow moving vehicle sign are attached correctly. Moreover, the lamps should be checked for correct functioning.
- Before driving with the attached machine, make sure that the hydraulic unit of the machine is depressurized (unless otherwise instructed in the operating instructions).
- When driving on public roads, always observe the valid traffic regulations. The travel speed must be adapted to the specific conditions.
- When driving, please take into consideration the additional mass resulting from the machine's weight. It may affect the reactions, the steerability and the braking function of the tractor.
- Please note that the machine rear sways when turning.
- Pay attention to the machine's height near bridges or other height restricting objects.
- When backing off, the machine may obstruct the rear view. Exercise extreme caution. If necessary, ask a flagman to help you; he can indicate the required distances.
- It is prohibited for other people to ride on the machine.

- Never insert any body part into the machine with the engine running.
- If any faults arise that may jeopardize occupational safety, turn off the machine.
- During operation, the machine's operator is responsible for safety in the whole work area. Work may not be carried out in the presence of any factors that jeopardize occupational safety.
- Exercise extreme caution when hitching / unhitching the machine from a tractor/trailer.



The machine's operator must have constant, unobstructed visibility of the work area. If this is not possible, the operator must work with an assistant.

- Look out for moving parts when the machine is in operation.
- Secure the machine against unauthorized and accidental operation (e.g. moving when parked) whenever it is left unattended.
- Never leave the machine running unattended.
- Avoid causing fast, stroke-like loading.
- Never exceed the given operating values.
- All safety and warning signs on and in the machine must be legible and intact.
- The machine may not be operated by persons who are unwell or under the influence of drugs or alcohol.

OPERATION



Many occupational accidents take place in abnormal circumstances. Therefore it is important to take into account all the possible circumstances that may arise during operation of the machine.

- Depending on the machine's type, it will have diverse safety devices and protectors. These are meant to protect the machine and its operator, and they must never be removed or altered. Never start up or use the machine without all the safety devices and protectors in place. Also check the universal joint's safety equipment and joints.

MAINTENANCE

- The machine may only be serviced and repaired by professionals.
- Electrical and hydraulic faults may only be repaired by authorized professionals.
- In cases requiring welding, contact the manufacturer.
- Turn off the tractor engine and disconnect the universal joint before beginning service or maintenance actions.
- Before any maintenance work, turn the main power switch of the tractor to OFF.
- Ensure that there is no pressure in the hydraulic system.
- Take out the key from the tractor's ignition for the duration of the servicing or maintenance. Check that the power is off from the machine you are working on.

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- When servicing the machine, place it on a level surface and ensure that it cannot be moved.
- Observe the service intervals and annual safety inspections.
- All spare parts and equipment must fulfill the manufacturer's requirements. This can be guaranteed by using original parts.
- Put all safety devices back into place immediately once servicing or maintenance is complete.



When lifting the machine, check that the lifting/hoisting equipment is in perfect working order. Check the weight of the machine before lifting it. Choose lifting trajectories so that they do not cause any danger.

Many countries have specific legislation on lifting, hoisting cables and hoists. Always comply with local safety regulations.

OILS AND LUBRICATION

- Always use the oil types recommended by the manufacturer. Other types of oil may cause faults or improper operation of the equipment, which could lead to serious damage to people or property.
- Never mix different liquids or oils.
- Always follow the manufacturer's lubrication instructions.
- Use control equipment carefully until the hydraulic oil has had time to reach its operating temperature.

SAFETY INSTRUCTIONS FOR HYDRAULIC CIRCUITS

1. Work on hydraulic equipment may only be carried out by professional hydraulic engineers.
2. Be cautious when using the equipment in cold conditions.
3. Check the machine for leaks. Do not use the machine if there is a leak from any system. Check all hydraulic hoses – particularly those which are bent during use – and replace any that are in poor condition or have leaks. Ensure that all joints are tight and that the lines are not damaged. Check that all protective caps and filler caps are closed properly. Check the hose sheathing for damage.
4. Check that all hose connectors, lengths and qualities comply with applicable requirements. When replacing or repairing hoses, use original parts or hoses and connectors recommended by the manufacturer. Check particularly that the pressure classes of the hoses and connectors are suitable to the operating pressure levels.
5. Check that all safety devices such as pressure relief valves, etc., are in place and work properly. Familiarize yourself with their use. Safety systems may never be bypassed.
6. Check the main hydraulic parts daily, and always after a fault. Replace any damaged parts immediately.
7. If a component is damaged, clean it before repairing it. Do not use solvents when cleaning parts.
8. Do not attempt to carry out repairs that you are not fully familiar with.
9. Never carry out repairs of the hydraulic circuit when the system is pressurized. When pressurized, the oil spray can penetrate the skin and cause mortal danger.
10. Never work below a device or component that is only being held up by hydraulics. Use separate supports when carrying out maintenance or repairs. Do not disconnect cylinders or their valves until the machine is well supported.
11. Most hydraulic oils do not evaporate easily. Risk factors include hot oil, spills and oil mist (pressurized).
12. If oil gets into your eyes, rinse with plenty of water and contact a doctor.
13. Avoid prolonged or repeated contact with your skin.
14. If sprays or contact with the skin cannot be avoided, use protective gloves, goggles and clothing as necessary. Do not use oily clothing.

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15. Avoid discharging hydraulic oil into the environment, as it can pollute waterways and the groundwater. If biodegradable oil is to be used, please contact the manufacturer beforehand and have the suitability of your equipment for the operation with biodegradable oil confirmed by him before such oil is used.
16. Store the oil in sealed containers provided by the manufacturer. Try to transfer the oil directly from its container into the tank.
17. If the oil must be passed through other containers, ensure that they are completely clean. Caps, funnels, sieves and filling holes must also be clean.
18. Never store oil outdoors, as water could condense in it.
19. Always dispose of oil in a suitable container, never into the environment!

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SAFETY INSTRUCTIONS FOR LOADERS

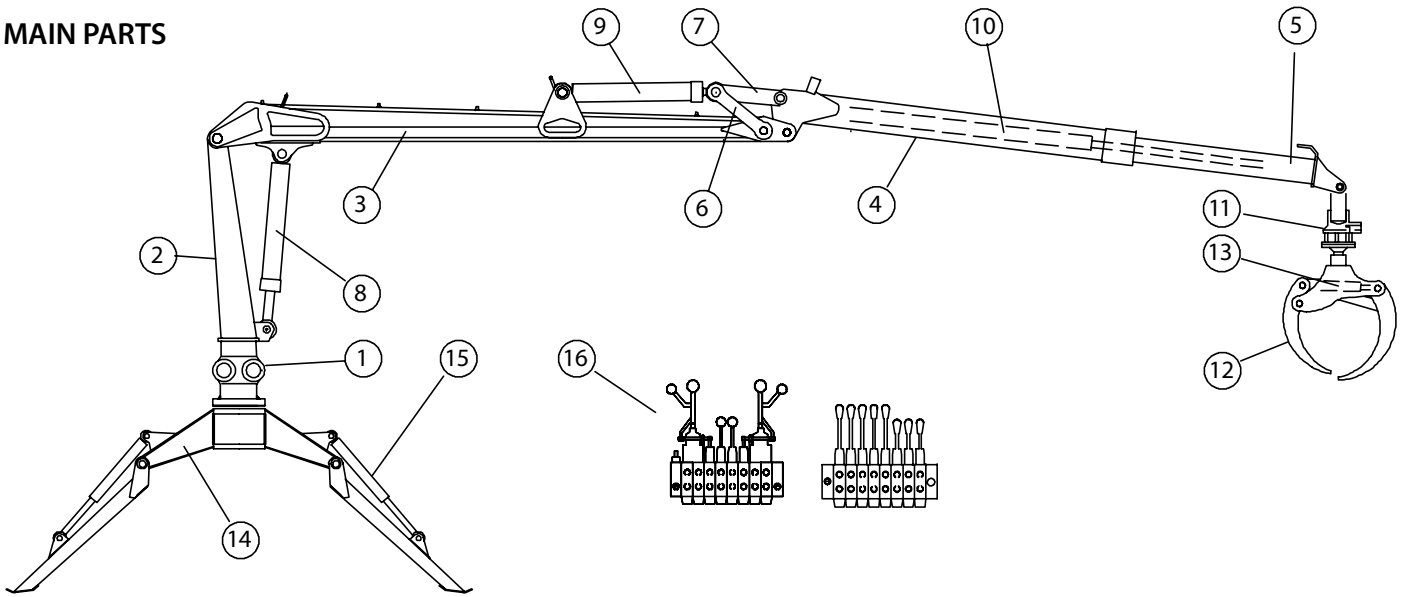
- Ensure the machine is properly supported during storage.
- Council of State Decision 856/1998 requires that loading crane operators be at least 18 years of age and have received sufficient instruction in its operation. This applies in Finland.
- Before starting the machine, ensure that there are no bystanders within a radius of 20 meters.
- During operation, the vehicle must be positioned on sufficiently solid ground, in a properly stable position. The support legs must be used in all circumstances.
- Always put on the parking brake during loading.
- Do not exceed the given load values.
- Never stand beneath a hanging load.
- Do not leave booms in raised position unattended!
- The loader must not be used for lifting people.
- When lifting, note that the booms sag slowly.
- When working in the proximity of live wires, always adhere to the given safety distances (cf. table).
- Take particular care when lifting heavy loads and turning the loader to the side.
- Never use the loader for towing.
- Do not run the machine's movements to their extremes at full speed.
- If the vehicle assembly falls over, do not jump out of the vehicle.
- If the booms sag down under excess loading, use the shifting boom to shift the load closer to the column. Do not open the grapple.
- If the machine comes into contact with a power line, do the following:
 - Call for assistance immediately and ensure that no one enters the danger zone.
 - If you are outside the machine, do not touch any part of the machine.
 - If you are inside the machine, leave it by JUMPING OUT. When you jump, make sure both feet touch the ground at the same time. Do not touch the vehicle or the ground with your hands after jumping out. Move at least 20 meters away from the vehicle by hopping on two feet.

Voltage rating, kW	Minimum distance, m		
	Overhead line		Pendant line
	below	on side	
<1	2	2	0,5
1-45	2	3	1,5
110	3	5	-
220	4	5	-
400	5	5	-

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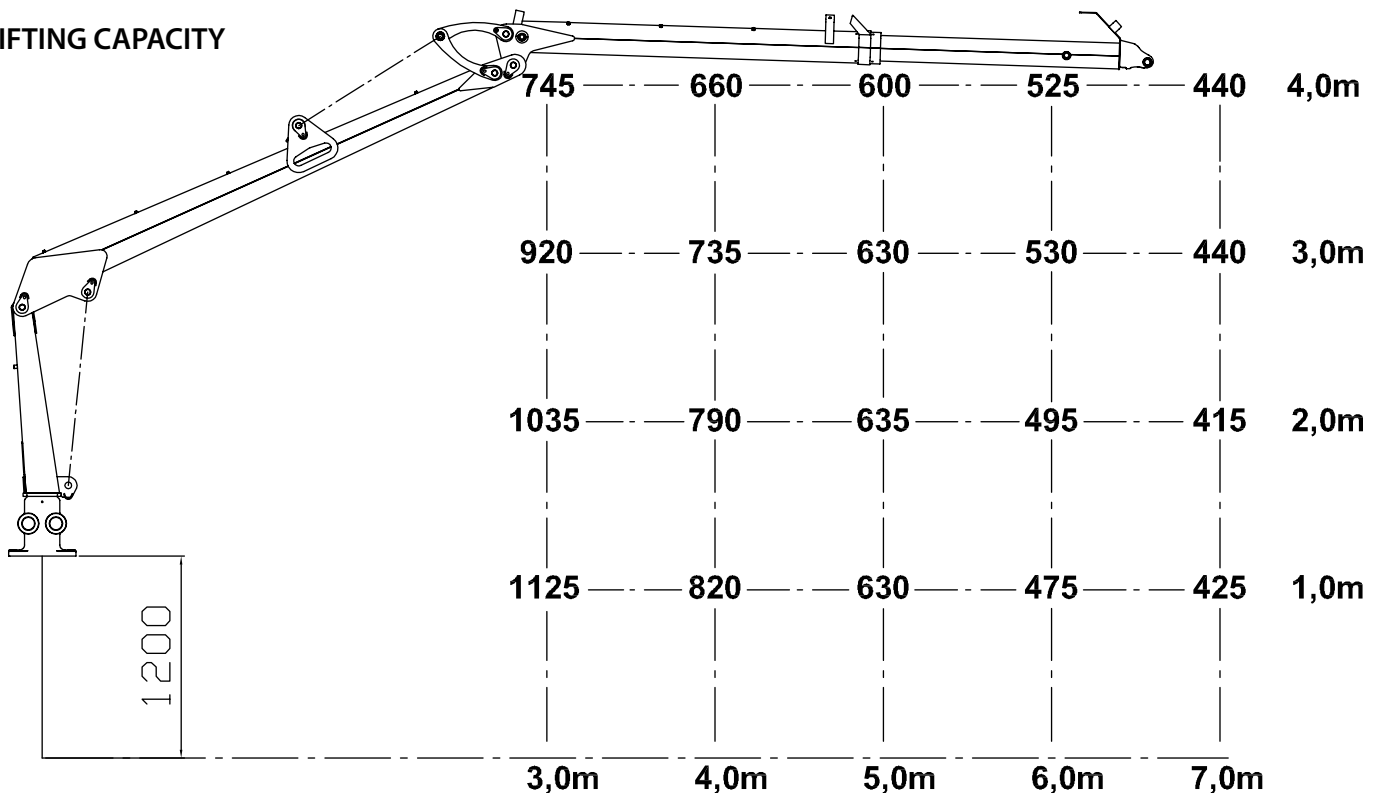
TECHNICAL DATA

MAIN PARTS



- | | |
|---------------------|--|
| 1. Slewing device | 9. Folding cylinder |
| 2. Column | 10. Extension cylinder |
| 3. Lifting boom | 11. Pendant + rotator |
| 4. Folding boom | 12. Grapple |
| 5. Extension boom | 13. Grapple cylinder |
| 6. Side bar | 14. Mounting rack + hydraulic support legs |
| 7. Draw bar | 15. Support leg cylinder |
| 8. Lifting cylinder | 16. Control valve |

LIFTING CAPACITY



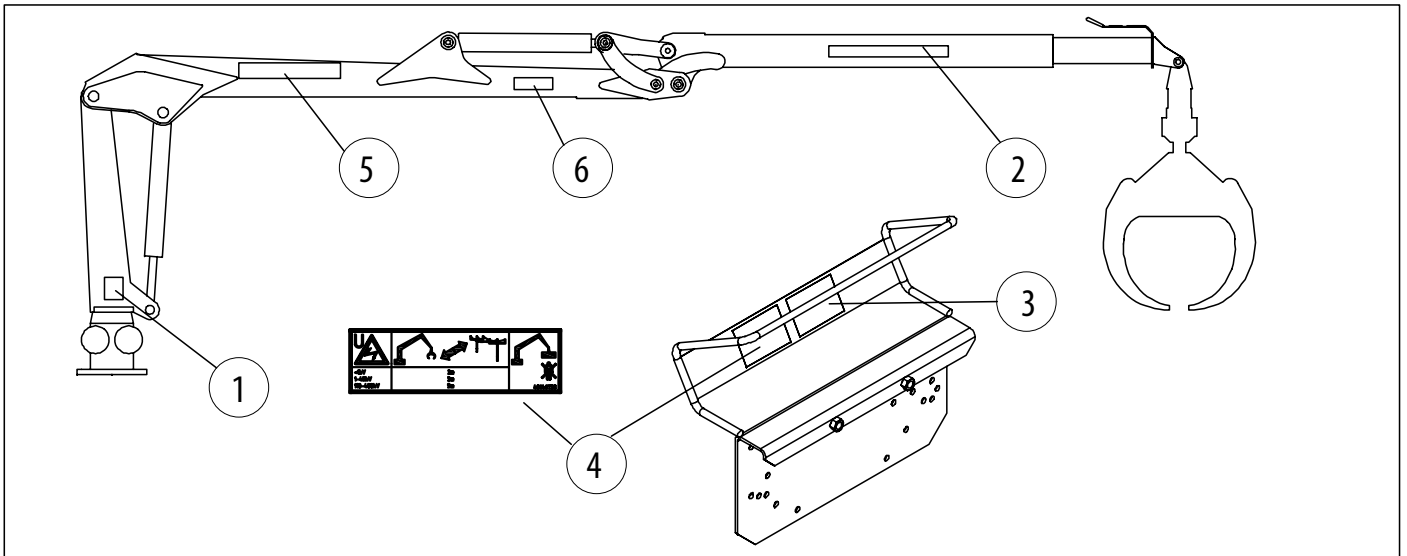
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TECHNICAL DATA	FARMI 4670
Lifting torque, kNm gross	46,0
Max. reaches, m	7,0
Lifting capacity, kg, 4 m, without grapple and rotator	820
Lifting capacity, kg / max. reach, without grapple and rotator	420
Slewing angle, °	380
Slewing torque, kNm	11,6
Max. working pressure, bar	180
Recommended pump capacity, l / min	30-60
Grapple area, m ²	0,20
Rotator (rotating angle continuous)	GR46
Rotator torque, kNm	0,86
Weight – pendant, grapple and rotator, kg	122
Total weight with grapple + rotator + pendant, kg	822
Mounting rack + hydraulic support legs weight, kg	220 / 267

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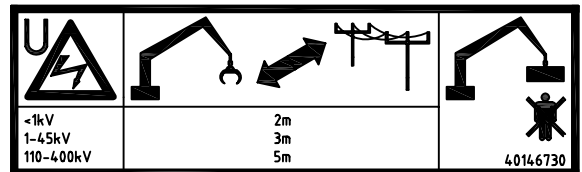
STICKERS AND PLATES

These stickers and plates must be found on the crane. Replace missing stickers or plates immediately.



Farmi Forest Corporation		CE
Ahmolantie 6 FIN-74510 IISALMI FINLAND		
TYPE	FORESTRY CRANE	41018510
MODEL	HK4670	
SERIAL NO.		
YEAR OF MANUFACTURE	20	
WEIGHT CRANE/WITH AP	850/1070 kg	
MAX. HYDR. PRESSURE	180 bar	
OIL FLOW NEEDED	30-60 l/min	

1. Machine plate FARMI 4670 (41018510)



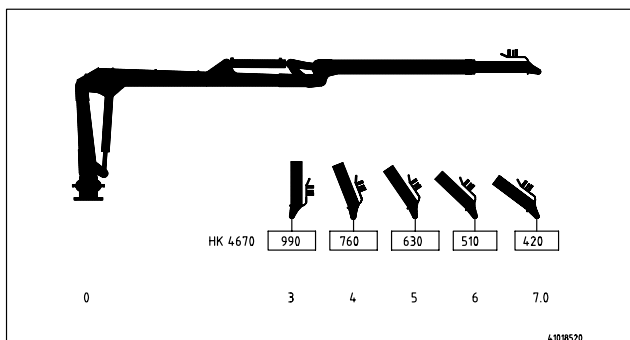
4. Minimum distance (40146730)



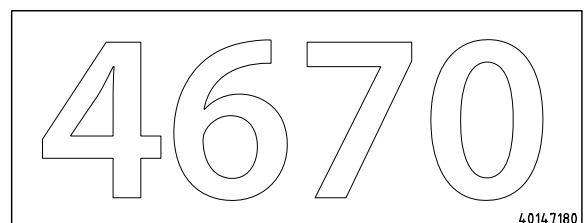
2. Danger area 20 m (40146720)



5. FARMI Forest (40147100)



3. Lifting capacity FARMI 4670 (41018520)



6. Sticker 4670 (40147180)

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ASSEMBLY AND MOUNTING



Read these instruction before starting any assembly or mounting work. Improper mounting work can cause hazards during use of the crane. Mounting carried out in a manner other than that specified in this manual can expose the user to danger and will void the manufacturer's guarantee.

Check the stability of the crane-vehicle assembly by performing the necessary calculations. See "Determining the stability".

The mounting must be performed by the manufacturer or a service center or person authorized by the manufacturer.

The strength class of the mounting bolts is 10.9. Use self-locking nuts, e.g., DIN985.

Put all screws into place. First tighten all screws in threaded holes to torque, and then all screws in unthreaded holes.



Retighten the bolts after the test run and the first day of use.

When mounting the crane on a foundation not delivered by FARMI Forest, use the mounting plate shown in figure 1. In mounting, allow enough space for servicing and repairs.

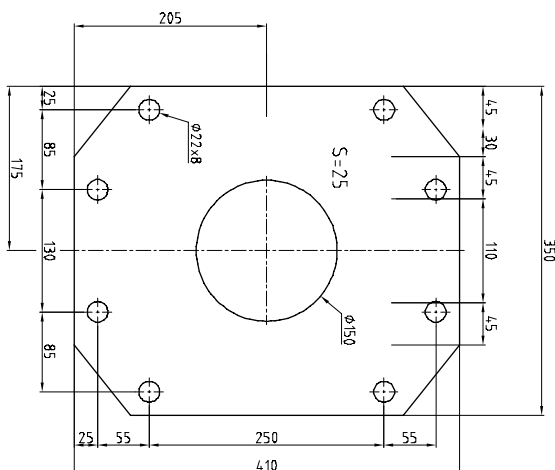


Fig 1.

INSTALLATION INSPECTION

Decisions 354/83 and 530/83 made by the Finnish Council of State stipulate that an installation inspection must be performed for each crane-vehicle assembly before use.

An inspection form can be found in this manual.

The person performing the inspection must be familiar with the crane's construction and operation.

MOUNTING THE MULTI- AND DOUBLE-ACTING VALVES



The valve must be positioned or covered so that the levers cannot be used inadvertently.

Install the valve using the included bracket at the desired location, paying attention to the direction of the hoses and movement during loading and transferring so that there is no risk of abrasion or clamping.

The label indicating the safe distance from live conductors must be clearly visible during operation.



Hoses in the operator's cabin must be protected so that the user is not endangered by oil jets in the event of breakage.

The levers in the multi-lever valve can be moved to different positions if necessary. Detach the levers from the valve before moving them.

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CONNECTION TO THE HYDRAULIC SYSTEM

Before connecting the crane to the tractor's hydraulic system, make sure that the oils are compatible. The crane has been tested using ISO VG46S oil that meets the API SE, CD, and API GL-4 requirements.

We recommend connecting the pressure hose to the single-acting hydraulic outlet and the return hose to the tank via the return filter. The filter's intended flow rate is 80 l/min and the filtering density 25 µm abs.

The crane can also be connected to the double-acting hydraulics outlet. If this is done, make sure that the lever of the double-acting valve controlling the flow is in the right position so that the pressure is directed to the pressure connection of the crane's control valve. Check the operation of the double-acting outlet in the vehicle's operating manual.

COMMISSIONING



Before using the crane, familiarize yourself with the operating and safety instructions.

INSPECTIONS BEFORE TESTING

Do not pressurize the hydraulic system before connecting the control valve's 1/2" quick couplings to the vehicle's hydraulic system.

Connect the pressure hose (P) to the valve as indicated by the arrow and the return hose (T) to the vehicle as indicated by the arrow.



Do not pressurize the control valve's return line (T) – this could cause the valve to break. Ensure that the 1/2" quick coupling are locked.

The person testing the crane must be qualified to use it.

1. Read the installation inspection report. If no installation inspection has been performed, do not use the crane.
2. Ensure that the control valve's pressure line (P) has been connected properly and that the return (T) is unobstructed.
3. Check the hydraulic oil level.
4. Familiarize yourself with the control valve's functions.
5. Ensure that the hoses can move freely. Remove any transport supports and ties.
6. Ensure that there are no people or obstacles in the operating area. The danger zone is 20 m.
7. The crane must be tested on a level, firm base.

TESTING

1. Ensure that the control valve's control levers are in the middle position.
2. Connect the oil flow to the crane. Let oil flow through the valve for a while.
3. Lower the support legs.
4. Carefully drive the crane movements one by one to their extreme positions and repeat this until the movements are smooth.
5. After testing the crane, inspect the joints and repair any leaks.
6. Check the mounting bolts of the crane and the fitting stand, and tighten them if necessary.
7. Check the hydraulic oil level, and top up the oil if necessary.



Be careful when bleeding air from the system. If you drive a cylinder to its extreme position at full force, the air pressure in the cylinder will damage the seals.



Be extremely careful when there is air in the cylinders.

PRACTICE RUNS

- Drive through every movement with an unloaded crane, paying attention to the positions in which the crane can hit obstacles.
- Move the control levers smoothly and steadily, avoiding quick and jerky movements.
- Learn to use several functions simultaneously. This enables smooth, precise operation.
- Start off at a low engine speed in order to avoid sudden movements.
- When you have become accustomed to the crane's movements, choose the appropriate engine speed so that operation is efficient but you still have the movements under control.

The lowest recommended operating temperature for the crane is -25°C .

Note that the hydraulic seals, hoses, and steel structures are prone to damage at low temperatures.

When starting work at cold temperatures, first let the oil flow freely through the valve for a couple of minutes.

The maximum operating temperature for hydraulic oil is $+75^{\circ}\text{C}$.



Use the support legs only to provide additional support for the vehicle.

When working on an inclined surface, do not load the crane with the full lifting torque, and be extremely careful.

When loading from uphill, note that the slewing movement may not be able to support the load but the pressure relief valves can be overloaded and the load can move down, causing a danger of the crane falling over.



Never move the boom to its extreme position at full speed!



Be careful when working near electric cables. Observe the safe distances.

When transferring the crane, support it against the trailer body or load.

DETACHING THE CRANE

Ensure that the ground under the crane is sufficiently hard and level.

Ensure that there are no extra people around and that no danger will be caused to others where the crane is to be stored. Pay special attention to the storage location of the control valve, ensuring that, e.g., it is out of the reach of children.



Always switch the pump off before removing the quick coupling between the crane and the vehicle.



When detaching the crane from the vehicle, make sure that there are no people in the immediate vicinity.

1. Lower the support legs to the desired height.
2. Lower the booms as shown in fig. 2.
3. Lower the crane using a hoist.
4. Make sure that the crane cannot lean over. Fig. 2.
5. Detach the crane from the vehicle.
6. Detach and cover the control valve's quick couplings.

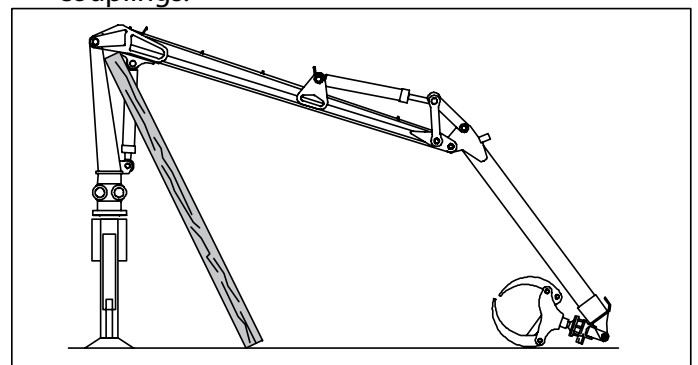


Fig. 2. Lowering the booms

STORAGE INSTRUCTIONS

1. Clean the crane and, if necessary, touch up any points where paint has peeled off.
2. Lubricate the crane thoroughly (see Lubricating Instructions).
3. Release the pressure from the cylinders.
4. Protect the cylinder piston rods and exposed parts of the control valve with grease.
5. Store the crane in a sheltered area, away from direct contact with the ground.
6. When you start using the crane again, remove the protective grease from the cylinder piston rods and the control valve.

MAINTENANCE

- Maintenance work must be carried out regularly to ensure safe and trouble-free operation.
- Always use the appropriate tools.
- Determine the location of the defect.
- Keep the disassembled sections, removed parts, and the repair area protected from dirt.
- Clean the parts using kerosene, never fuel oil.
- Valve adjustments and repairs are to be performed by dedicated service personnel.

SLEWING DEVICE

- See maintenance table.

BOOMS

- Keep the axial clearance in the joints as small as possible. Do not over-tighten.

REPLACING BEARINGS

- When installing bearing sleeves, use an appropriate drift.
- Make sure that the new bearing's grease hole meets the nipple.
- If the bearings have grease pockets, fill these with Vaseline.

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PRESSURE MEASUREMENT

Always make the adjustments with the manometer in place.

- The main pressure is measured from the measuring point in the control valve's inlet section.
- Adjustments and inspections for each movement:
 - Set the main pressure relief valve to 5 bar above the value set for the protective valve.
 - Perform the movement, and check and adjust the pressure if necessary.
 - Finish by adjusting the main pressure to the set value.
- Pressure measurements are to be performed at the normal operating temperature and at the normal flow rate.
- The free flow pressure can be read from the manometer when the flow of oil is directed through the valve.

REPAIR WELDING

If welding is required for modifying or repairing the crane, note the following:

- Have welding work always performed by qualified personnel; class C. Class B is only required for welding joints which must withstand high stress.
- Remove paint and any oil from the location to be welded.
- Connect the ground terminal directly to the piece to be welded – there must be no joints in between.
- Use OK 48.00 or equivalent electrodes. The electrodes must be dry.
- Improperly welded structures can get fractured.

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MAINTENANCE TABLE

OBJECT	ACTION		
	Maintenance interval, working hours		
	8 h, or after working shift	50 h, or after working week	After 250 working hours or once a year
General	Check cylinders and leakages in hoses	Check pins and lockings Check fastening bolts	Check the condition of primary structures
Slewing device	Lubricate slide bearings Check oil level		Tighten the fastening bolts Adjust racks support bearings
Booms	Grease slide bearings Lubricate extension's upper and lower surfaces		Check sliding bearings and sliding plates
Cylinders	Lubricate swing bearings Check condition of piston rod and piston rod oil ring		Sylintereiden laakereiden tarkistaminen
Grapple	Grease slide bearings		Check grapples fixing to rotor
Support legs, mounting base	Grease slide bearings		Check hydraulic cylinders bearings

FARMI 4670 Tightening torque		
Slewing device	700 Nm	screw M20x1,5-100 ZN 10.9 DIN 960
Slide pieces	22 Nm	screw M8x16 / M8x14 ZN88

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LUBRICATION

Using the appropriate hydraulic oils and lubricants is essential for the trouble-free operation of the machine.

CHANGING THE OIL

Change the oil according to the vehicle's maintenance recommendations.

The crane has been filled with ISO VG46S oil at the factory.

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

When changing oil, make sure that the oil grade being used is compatible with the system and any oil remaining in it.

HYDRAULIC OIL REQUIREMENTS

The freezing point must be below -50°C.

The viscosity must not be lower than 1.5 E^o, +50°C for piston pumps and 2.5 E^o, + 50°C for gear pumps.

The hydraulic oil must contain the necessary additives for lubrication, rust protection, and defoaming.

Hydraulic oils intended for use in tractors are usually also suitable for use in hydraulic cranes.

OIL AND LUBRICANT GRADE TABLE

OIL MAKE	HYDRAULIC SYSTEM		GREASE NIPPLES
	-10°C ...+30°C	-25°C...-10°C	
BP	ENERGOL SHF 46	ENERGOL SHF 32,22	ENERGREASE LS-EP2, L21M
ESSO	UNIVIS N46	UNIVIS N 32,22	BEACON EP2, MULTIPURPOSE GR MOLY
MOBIL	DTE 16	DTE 15,13	MOBILUX EP 2 MOBIL GREASE MP, SPECIAL
SHELL	TELLUS OIL T46	TELLUS OIL T32,22	ALVANIA EP GREASE 2
TEBOIL	HYDRAULIC OIL 46	HYDRAULIC OIL 32, 33	SOLID 2/ summer, SOLID 0/ winter
UNION / TEXACO	RANDO OIL HDZ 46	RANDO OIL HDZ 32, HYDRAULIC OIL HD 5W	MARFAK MULTI PURPOSE 2, MOLYTEX GREASE 2

LUBRICATING POINTS TABLE

Lubricating point	Qty	Action	Interval	Notes
Slewing device				
Bearings	3	Greasing	50 h	
Racks	2	Greasing	50 h	
Booms				
Articulation	6	Greasing	10 h	
Cylinder ends	6	Greasing	10 h	
Extensions surfaces	2	Lubrication	10 h	Apply grease to surfaces.
Grapple				
Articulation	6	Greasing	10 h	
Cylinder ends	2	Greasing	10 h	
Support legs				
Articulation	2	Greasing	10 h	
Cylinder ends	4	Greasing	10 h	

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TROUBLE SHOOTING

TROUBLE	POSSIBLE CAUSE	REMEDY
CRANES WORKING MOVEMENTS SLOW	PUMP IS TOO SLOW	CHECK PUMPS ROTATING SPEED
	FAULTY PUMP	CHANGE OR GET THE PUMP FIXED
	LEAKS OR OBSTRUCTIONS IN OIL LINES	INSPECT OIL LINES
	OIL TOO THICK	CHANGE TO A THINNER (CORRECT) OIL GRADE
CRANES DESCENDING MOVEMENTS SLOW	OBSTRUCTIONS IN THE OIL LINES	CHECK THE LINES AND THE CHOKES
	CLOGGED-UP (RETURN) FILTER	CLEAN OR RENEW FILTER
	OIL TOO THICK	CHANGE TO A THINNER (CORRECT) OIL GRADE
CRANES MOVEMENTS TOO FAST	ROTATION SPEED TOO HIGH OR PUMP TOO BIG	CHOOSE A CORRECT SPEED OF ROTATION AND CORRECT PUMP SIZE
	INCORRECT OPERATION	LEARN TO OPEN THE CONTROL VALVE TO A SUITABLE DEGREE
CRANES WORKING MOVEMENTS POWERLESS	NOT ENOUGH OIL	ADD OIL (AIR BLEEDING)
	FAULTY PUMP	CHANGE OR GET THE PUMP FIXED
	FAULTY RELIEF VALVE OR SHOCK VALVES	CHANGE THE RELIEF VALVE OR SHOCK VALVES
	FAULTY CONTROL VALVE	CHANGE OR GET THE VALVE FIXED
	FAULTY CYLINDERS OR SEALS	CHECK THE CYLINDERS AND CHANGE THE SEALS
CRANE MOVEMENTS ARE JERKY	AIR IN HYDRAULIC SYSTEM	CHECK OIL LEVEL, BLEED AIR FROM SYSTEM
	NOT ENOUGH OIL	CHECK THERE ARE NO OBSTRUCTIONS OR LEAKS ON THE INLET SIDE, ADD OIL
	FAULTY PUMP	CHECK THE PUMP AND GET IT FIXED
BOOMS DESCEND BY THEMSELVES	FAULTY CONTROL VALVE	INSPECT THE CONTROL VALVE AND GET IT FIXED
	FAULTY CYLINDERS OR HOSES FAULTY SHOCK VALVE	FIX THE LEAKAGE POINT. CHECK CYLINDERS AND SEALS, CHECK, CLEAN, ADJUST
CONTROL VALVE'S SPINDLES STICKING	VALVE'S FIXING SCREWS TOO TIGHT	CHECK SCREWS TIGHTENING TORQUE 50 Nm (5 kPm)
	VALVE NOT ON LEVEL MOUNTING BASE	MOUNT THE VALVE ON A LEVEL BASE
	VALVE'S TIE BOLTS TOO TIGHT, FAULTY SPINDLE	CHECK SCREWS TIGHTENING TORQUE (CONTACT THE MANUFACTURER), CHANGE A NEW BLOCK WITH SPINDLES

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TESTING THE STABILITY

The formulas and examples included in these instructions are based on the SFS 4677 standard.

During the test, the vehicle is in normal working condition without load, tilted 5° to the side. The ground must withstand the maximum load applied by the wheels or the other points of support.

The test is performed at the maximum reach with 10% overload. All normal crane functions are performed, but cautiously. The vehicle's 5° inclination is achieved by putting a suitable riser under one of the rear wheels. Its height can be calculated as follows:

h = riser height needed

z = vehicle width from wheel center to wheel center

$h = 0.087 \times z$

Example:

$z = 180 \text{ cm}$

$h = 0.0887 \times 180 \text{ cm} = 16 \text{ cm}$

The vehicle is considered stable if no more than one point of support rises off the ground during the test. Increased stability when loading it from the side can be achieved by lengthening the track and/or adding rear axle load by using, for example, wheel weights.

DETERMINING THE STAND-STABILITY BY CALCULATION

The crane is considered stable when the stability ratio "n" calculated from formula below is equal or larger than 1.

EXAMPLE 1

A1 = Normal distance from cranes turning center to overturning edge.

B1 = Normal distance from booms end (load) to overturning edge.

C1 = Distance from vehicles rear axles center and overturning edge.

E1 = Normal distance from booms point of support to overturning edge.

G = Maximum load at distance A + B

N = Cranes weight without booms

P = Booms weight (centroid)

M2 = Rear axle weight without load

n1 = Stability factor

EXAMPLE 2

A2 = Normal distance from cranes turning center to overturning edge.

B2 = Normal distance from booms end (load) to overturning edge.

C2 = Distance from vehicles rear axles center and overturning edge.

E2 = Normal distance from booms point of support to overturning edge.

G = Maximum load at distance A + B

N = Cranes weight without booms

P = Booms weight (centroid)

M3 = Rear axle weight without load

n2 = Stability factor

You can use the example for calculating the stand stability for any tractor by measuring "K" and "H" from the tractor. With these measures you can calculate "C".

K = Distance between the tractors rear shaft and the cranes pivot point

H = Tractors wheelbase

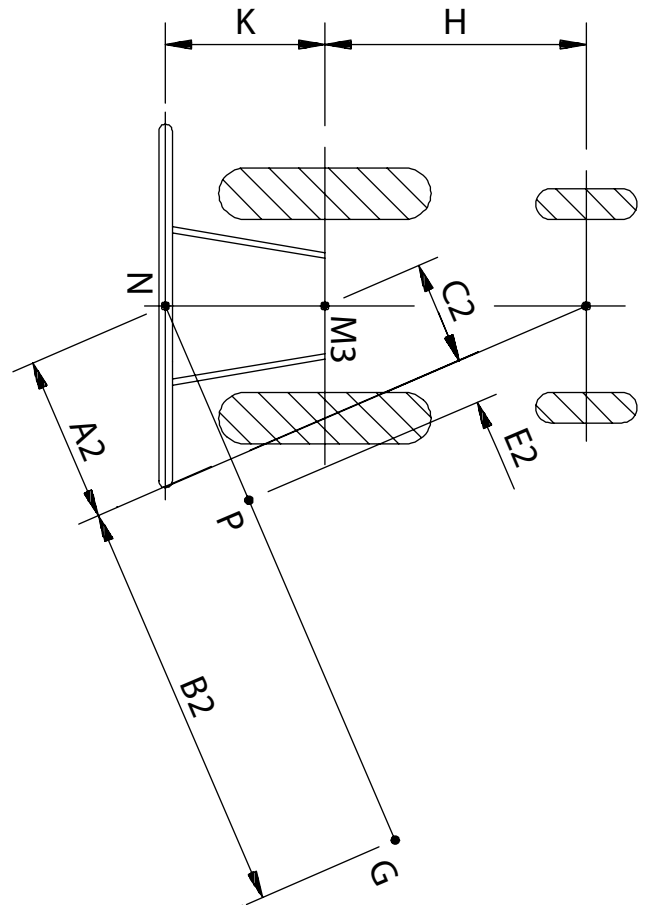
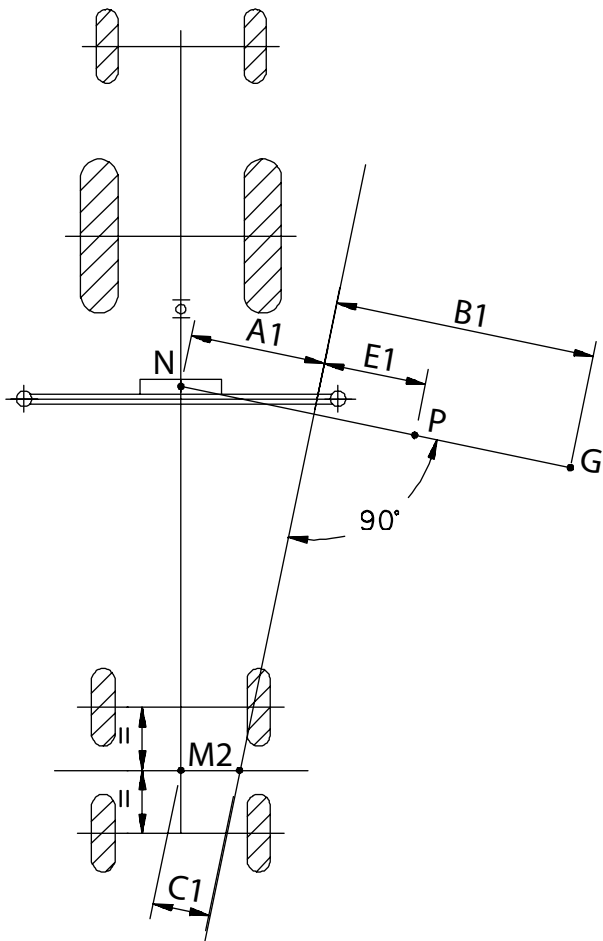
See the tractors manual for rear axle weight M3, "n" value must be more than 1.

Formula	C =	H x A
		K + H

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EXAMPLE 1		
tractor + FARMI 100 + FARMI 4670		
Formula	$n =$	$\frac{N \times A1 + M2 \times C1}{G \times B1 + P \times E1}$
N = 870 kg	B1 = 480 cm	C1 = 90 cm
A1 = 220 cm	P = 525 kg	M2 = 1000 kg
G = 420 kg	E1 = 100 cm	
$n1 =$	$\frac{870 \times 220 + 1000 \times 90}{420 \times 480 + 525 \times 100}$	=1,107

EXAMPLE 2		
tractor Valtra T190 + FARMI 4670		
Formula	$n =$	$\frac{N \times A2 + M3 \times C2}{G \times B2 + P \times E2}$
N = 520 kg	B2 = 560 cm	C2 = 120 cm
A2 = 140 cm	P = 525 kg	M3 = 2190 kg
G = 420 kg	E2 = 180 cm	
$n2 =$	$\frac{520 \times 140 + 2190 \times 120}{420 \times 560 + 525 \times 180}$	=1,018



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PRESSURE RELIEF VALVES

FUNCTION	MULTI-LEVER VALVE		
	MAIN PRESSURE RELIEF VALVE 185 bar		
	BLOCK	PRESSURE RELIEF VALVE (bar)	
A		B	
SLEWING	1	185	185
LIFTING	2	210	-
FOLDING	3	210	120
ROTATOR	4	-	-
GRAPPLE	5	-	-
EXTENSION	6	-	80
SUPPORT LEG, LEFT.	7	-	-
SUPPORT LEG, RIGHT	8	-	-

FUNCTION	2-LEVER VALVE		
	MAIN PRESSURE RELIEF VALVE 185 bar		
	BLOCK	PRESSURE RELIEF VALVE (bar)	
A		B	
SLEWING	1	185	185
LIFTING	7	210	-
FOLDING	2	120	210
ROTATOR	8	-	-
GRAPPLE	6	-	-
EXTENSION	3	-	80
SUPPORT LEG, LEFT.	4	-	-
SUPPORT LEG, RIGHT	5	-	-

FUNCTION	ON/OFF VALVE		
	MAIN PRESSURE RELIEF VALVE 185 bar		
	BLOCK	PRESSURE RELIEF VALVE (bar)	
pin locking		lever	
SLEWING	1	185	185
LIFTING	8	210	-
FOLDING	2	120	210
ROTATOR	7	-	-
GRAPPLE	5	-	-
EXTENSION	4	-	80
SUPPORT LEG, LEFT.	3	-	-
SUPPORT LEG, RIGHT	6	-	-

FUNCTION	EHC VALVE		
	MAIN PRESSURE RELIEF VALVE 185 bar		
	BLOCK	PRESSURE RELIEF VALVE (bar)	
A		B	
SLEWING	1	185	185
LIFTING	2	210	-
FOLDING	3	210	120
ROTATOR	4	-	-
GRAPPLE	5	-	-
EXTENSION	6	-	80
SUPPORT LEG, LEFT.	7	-	-
SUPPORT LEG, RIGHT	8	-	-

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HYDRAULICS

CONNECTION TO THE CLOSED CENTER SYSTEM (ON/OFF, 80 I)

1. Plug the drill hole at the bottom of port T with an R1/4" plug. Move the hose going to the tank here.
2. Plug the previous hole of the tank hose with an R1/2" plug.
3. Tighten the main relief valve by 3/4 turn so that its pressure is at least 5-10 bar higher than that of the tractor.

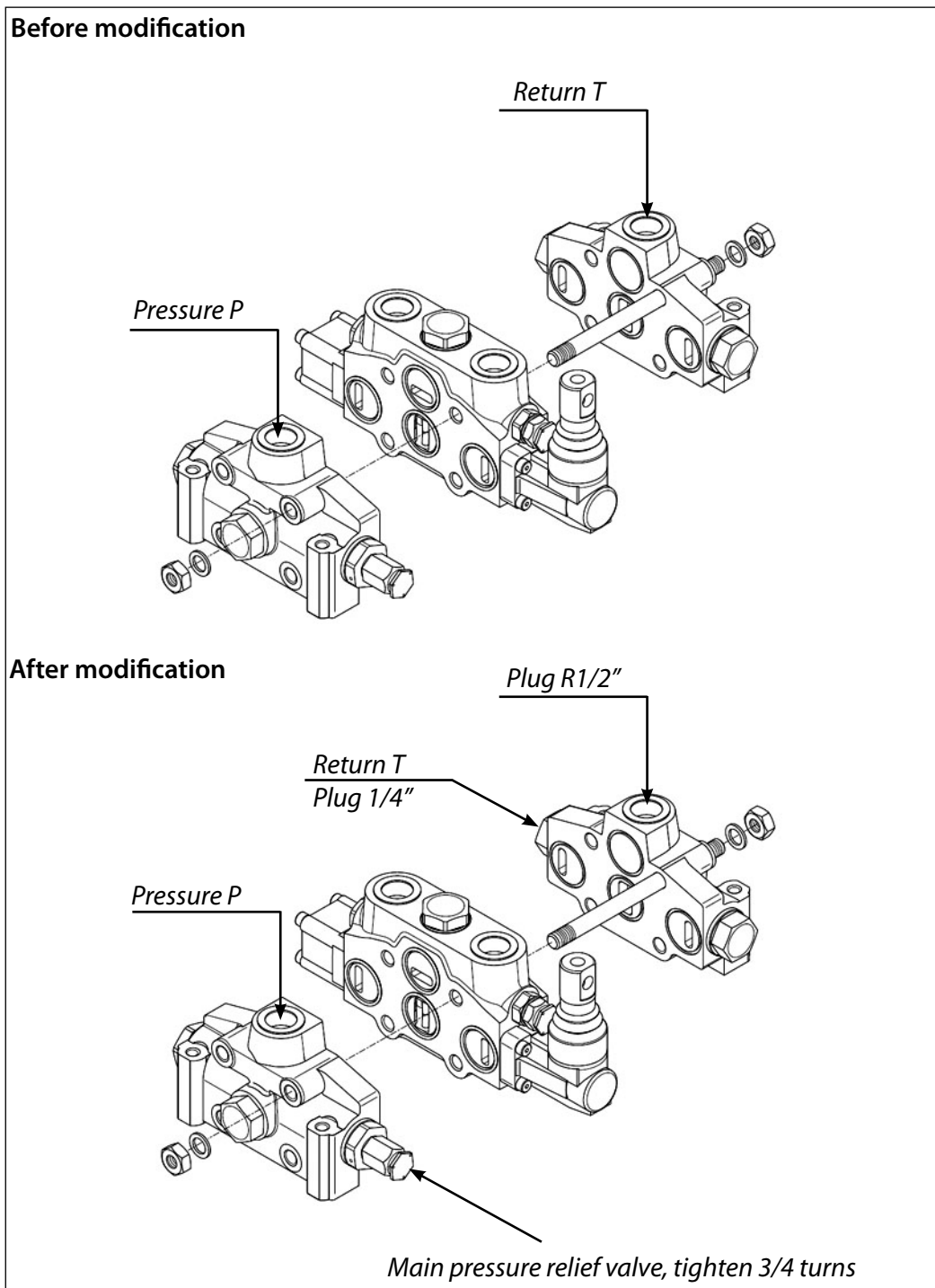
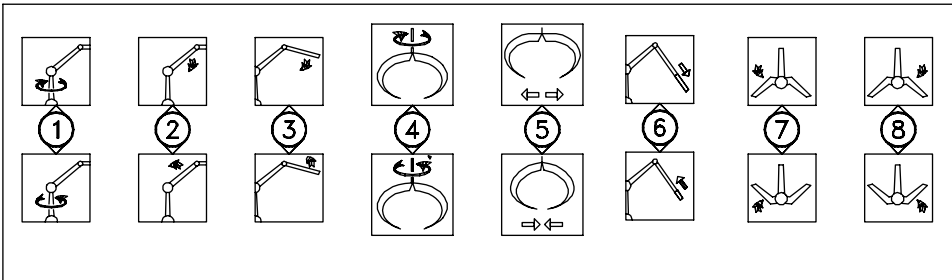
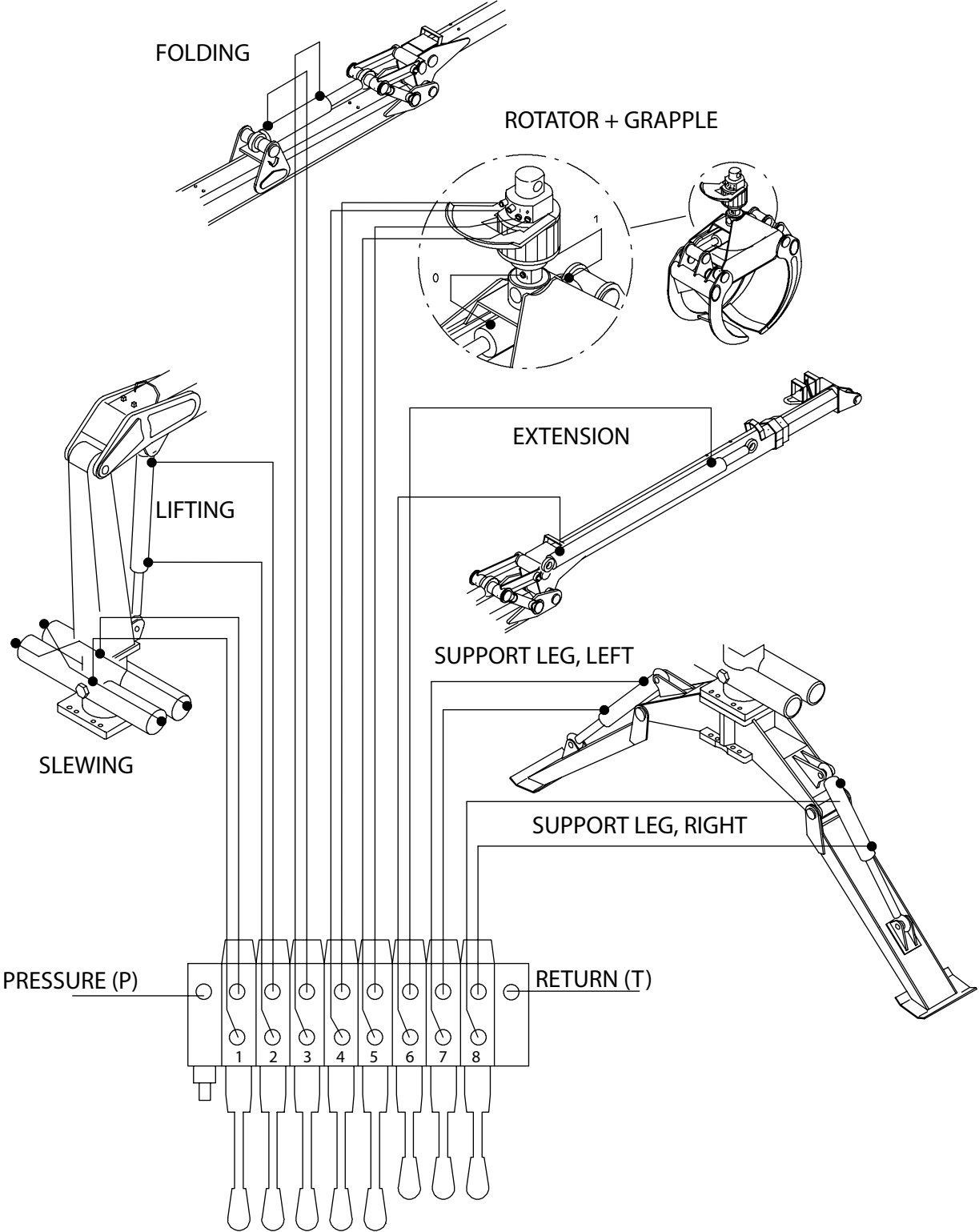


Fig 4. Modifying the valve for closed center system

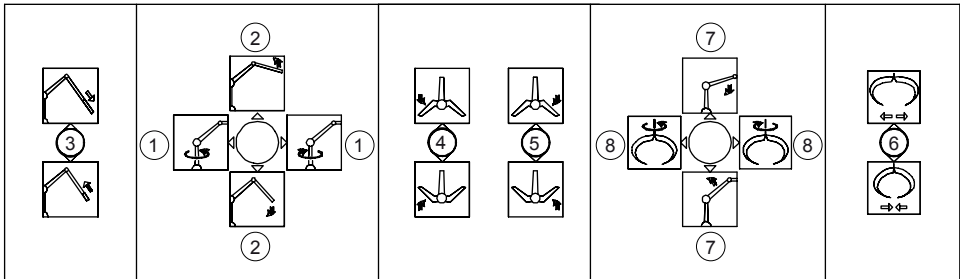
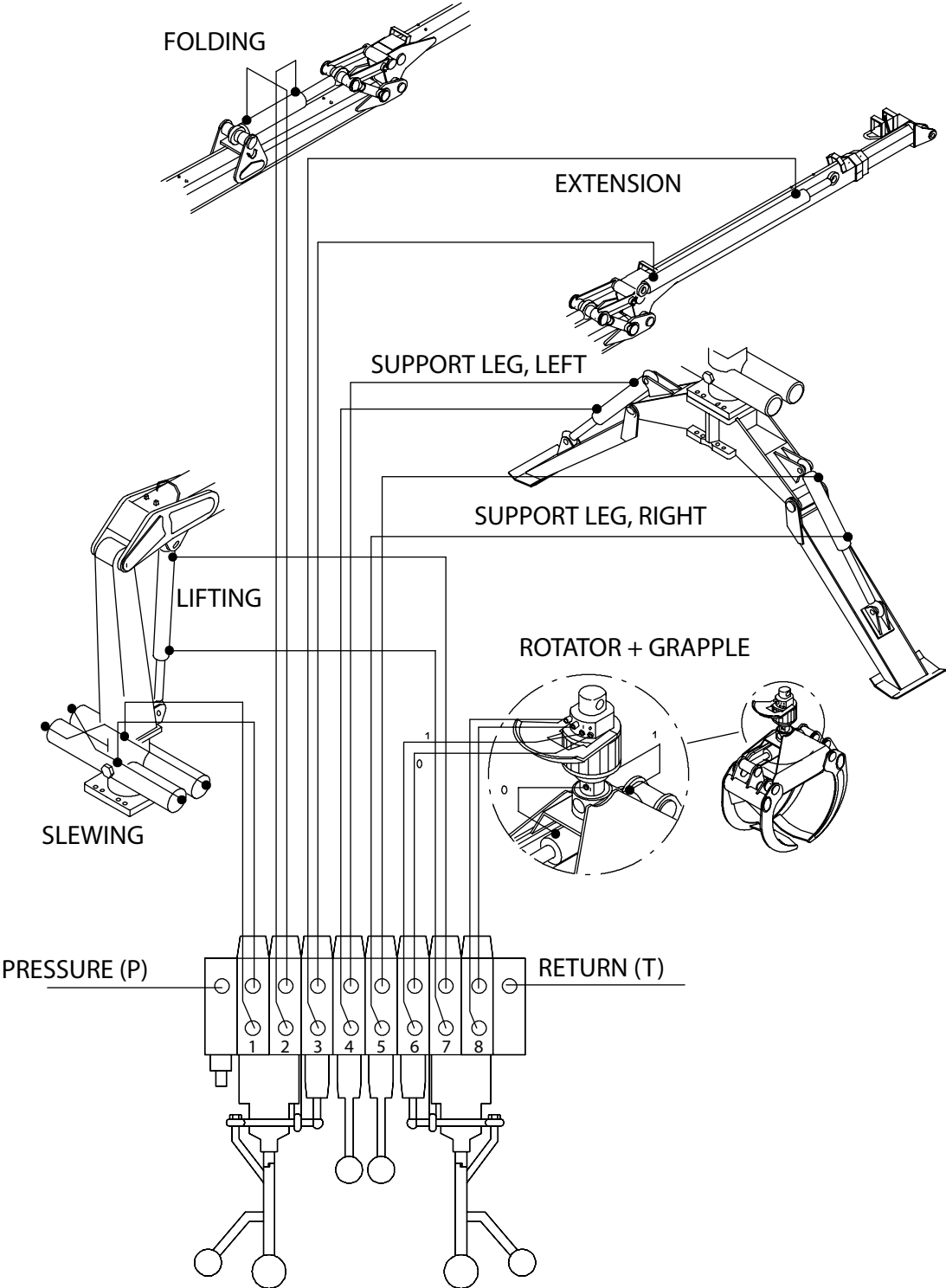
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CONNECTING THE MULTILEVER VALVE



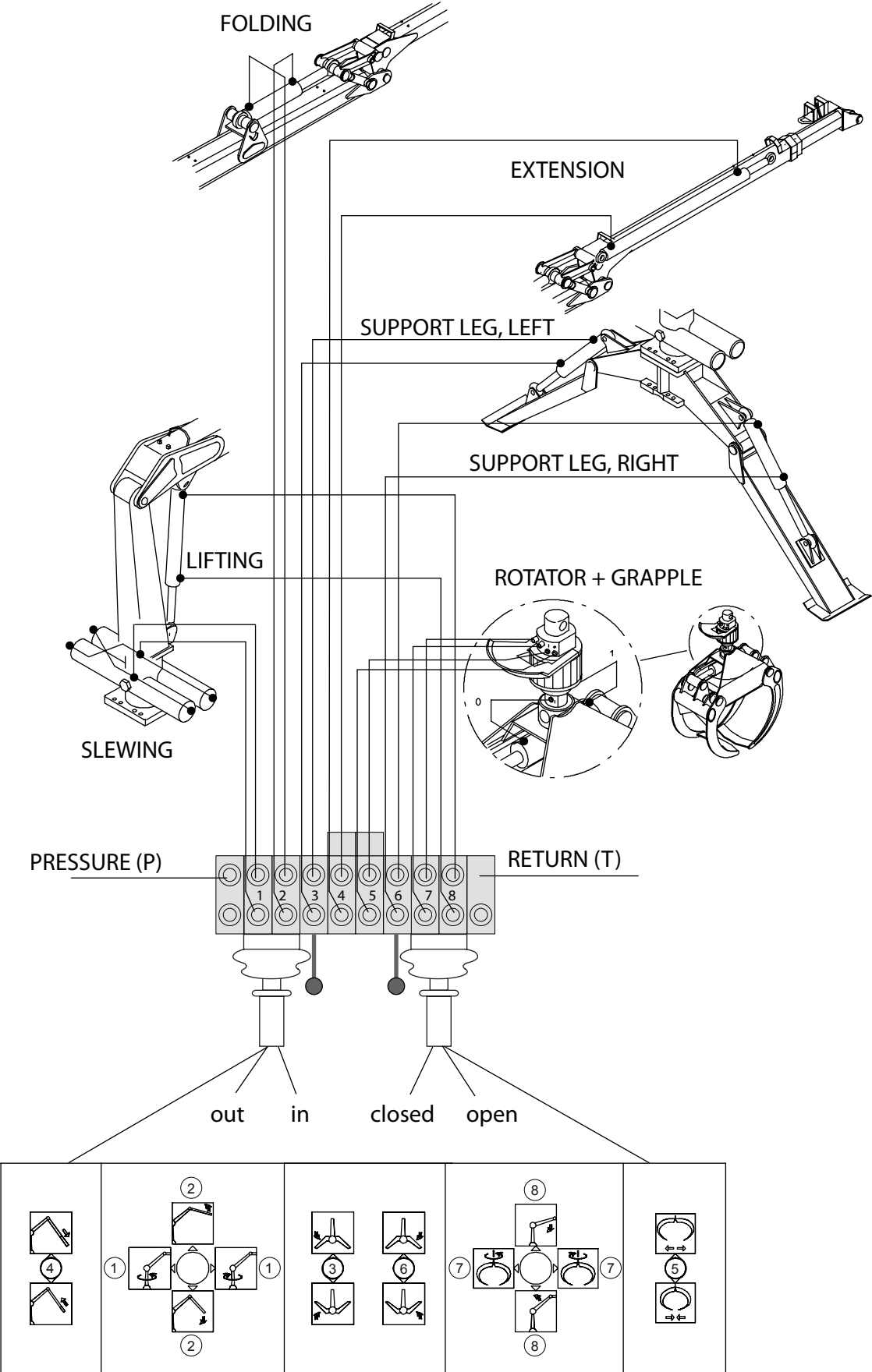
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CONNECTING THE 2-LEVER VALVE, (80 l)



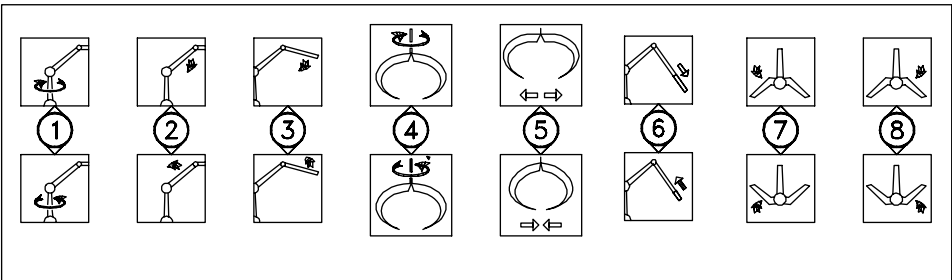
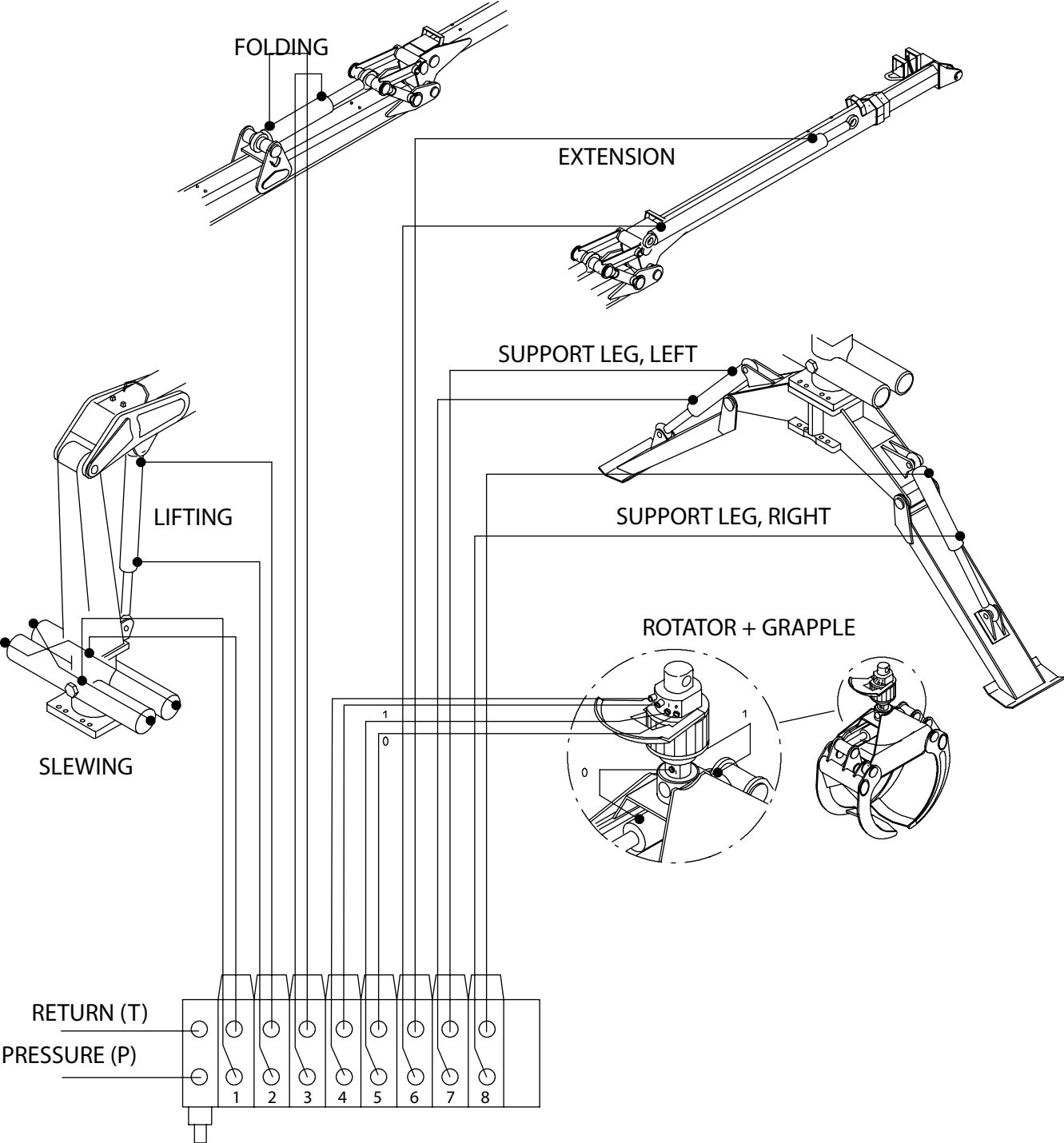
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CONNECTING THE ON/OFF VALVE (60 l)



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CONNECTING THE EHC VALVE



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INSTALLATION INSPECTION RECORD

CRANE TYPE	FARMI	CHASSIS: model	
SERIAL NO.		make, model	
YEAR OF MANUFACTURE			
Load test according to SFS 4261	date:	performed by:	

F = faultless R = needs repair

ITEM UNDER INSPECTION	Notes	F	R
1. Before installation; 3-point lift			
state of lifting arm			
state of pusher arm			
locking of tractive resistance sensor			
gaskets and cleanness of hydraulic connections			
2. Before test drive			
check state of machine, load and operating plates			
stick minimum distance warning label e.g. to valve connector or rear window			
check sizes and locking of loader's mounting pins			
check that the hydraulic hoses are connected correctly			
check that fast couplings are securely in place			
check that valve shafts move smoothly			
check the amount of hydraulic oil in the tractor			
check valve table attachment			
check shielding of hoses in the cabin and shielding of levers			
check tightness of loader fastening screws (cf. installation manual)			
3. During test drive			
cylinder bleeding			
determining stand stability			
test use with allowable load (cf. loading table)			
loader/cabin at various hoist positions			
loader/cabin at various boom positions			
hose friction			
4. After test drive			
sagging of booms, max. range 15 cm/min			
check amount of oil with cylinders broken in			
oil leaks; tighten joins if necessary			

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ANNUAL INSPECTION RECORD

F = faultless R = needs repair

ITEM UNDER INSPECTION	ANNUAL INSPECTION		
	F	R	NOTES
CLEANLINESS OF LIFTING BOOM			
WELDED JOINTS OF LIFTING BOOM			
WELDED JOINTS OF FOLDING BOOMS			
WELDED JOINTS OF COLUMN			
FASTENING OF ROTATOR			
STATE OF BRACKETS			
BACKLASH OF ROTATING DEVICE			
STATE OF SWIVEL AXIS BEARINGS			
STATE OF LIFTING BOOM BEARINGS			
STATE OF FOLDING BOOM BEARINGS			
STATE OF JOINT PINS			
LOCKING OF JOINT PINS			
STATE OF CONTROLS			
STATE OF CYLINDERS			
STATE OF CYLINDER GASKETS			
STATE OF PISTON RODS			
STATE OF HYDRAULIC HOSES			
STATE OF HYDRAULIC HOSE			
STATE OF HYDRAULIC CONNECTORS			
PROTECTION OF REGULATING VALVE LEVERS			
TIGHTNESS OF LOADER'S FASTENING			
OPERATION, MAINTENANCE AND INSPECTION MANUAL			
STATE OF SAFETY DISTANCE TABLE			
STATE OF LOAD SIGN			
STATE OF MACHINE PLATE			
HAS INSTALLATION INSPECTION BEEN CARRIED OUT?			
PRESSURE RELIEF VALVE _____ bar			
PROTECTION VALVES _____ bar			
STATE OF STRUCTURES AFTER MAX. ALLOWABLE TEST LOAD			
SAGGING OF BOOMS, MAX. RANGE OF 60 cm			
STATE OF SLIDE PLATES, MAX. GAP OF 8 mm			

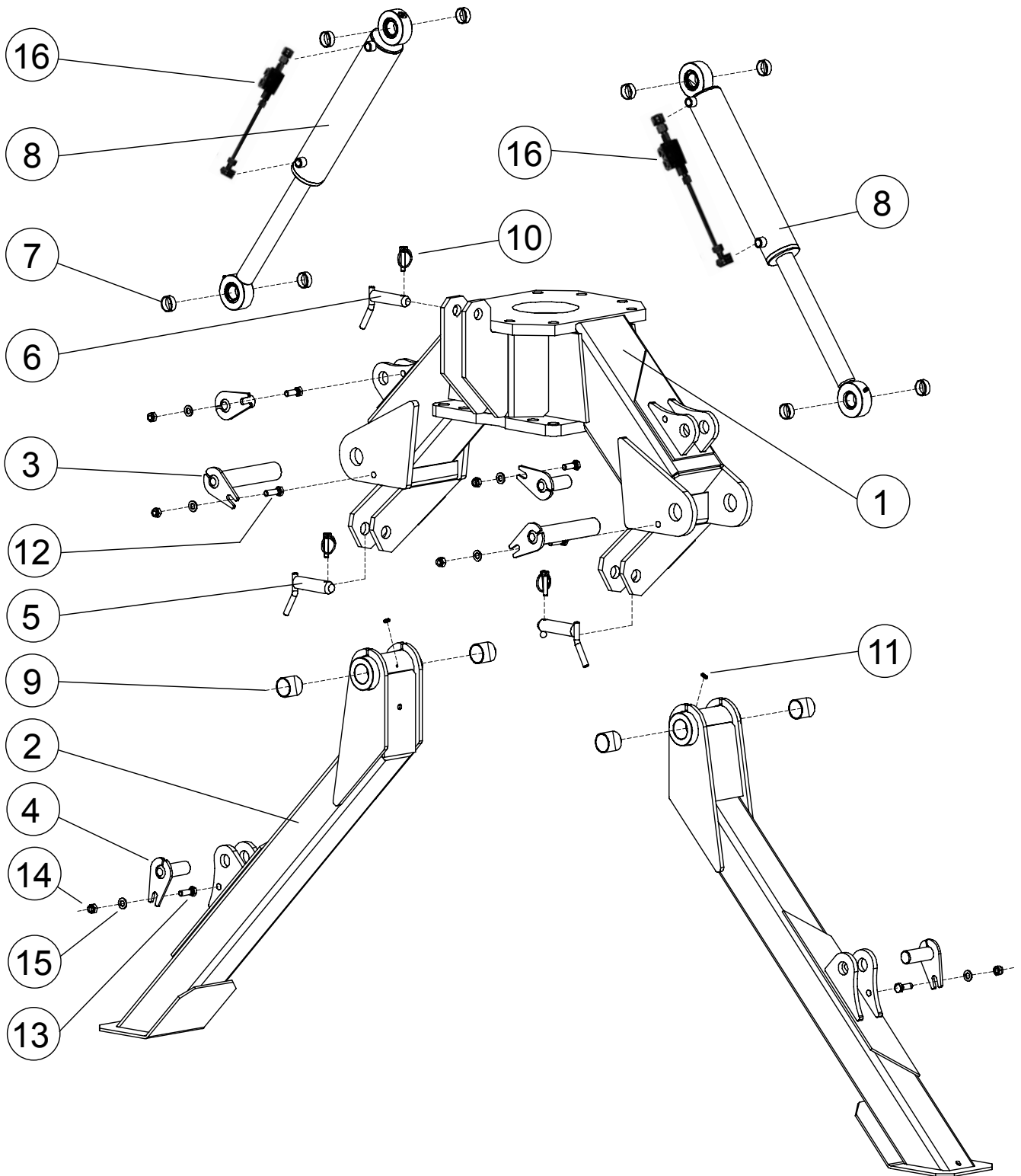
Inspector:

Date and place:

Notes:

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HYDRAULIC SUPPORT LEGS



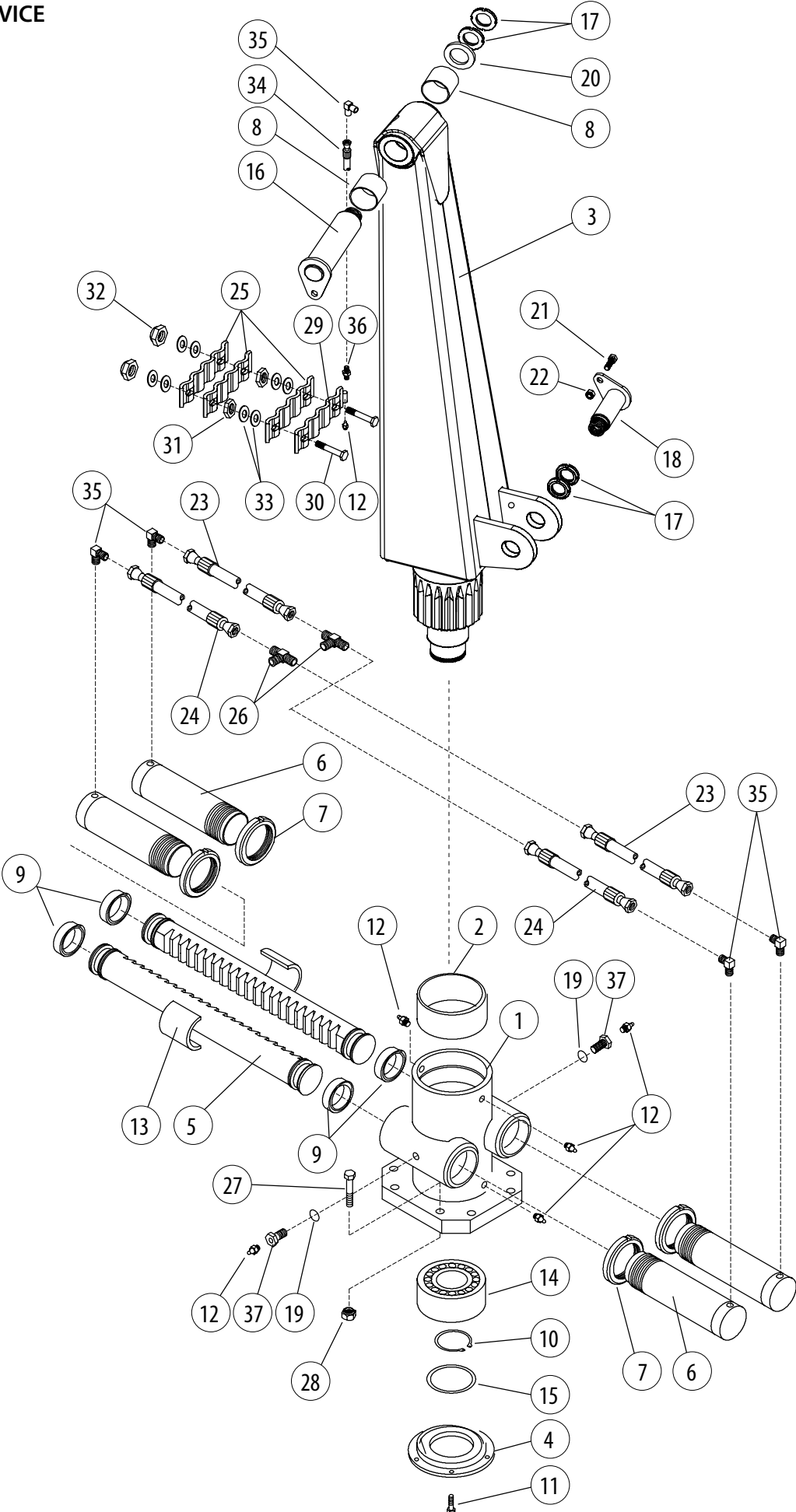
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HYDRAULIC SUPPORT LEGS

Part	Order no	Description	Remarks	Qty
1	58220910	Frame		1
2	58220920	Support leg		2
3	58220930	Pin		2
4	58220940	Pin		4
5	58220220	Pin		2
6	58220230	Pin		1
7	58220950	Bushing		8
8	58221120	Cylinder		2
8.1	04080660	Seal kit		2
9	58204610	Slide bearing		4
10	52842150	Ring cotter	10X45	3
11	52401023	Grease nipple	AM6	2
12	52062031	Screw	M12X40 DIN933 88ZN	2
13	52063591	Screw	M12X35 DIN933 88ZN	4
14	52117124	Lock nut	M12 DIN985 8ZN	6
15	52200052	Washer	M12 DIN125 58ZN	6
16	04071800	Pilot operated check valve		2

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SLEWING DEVICE



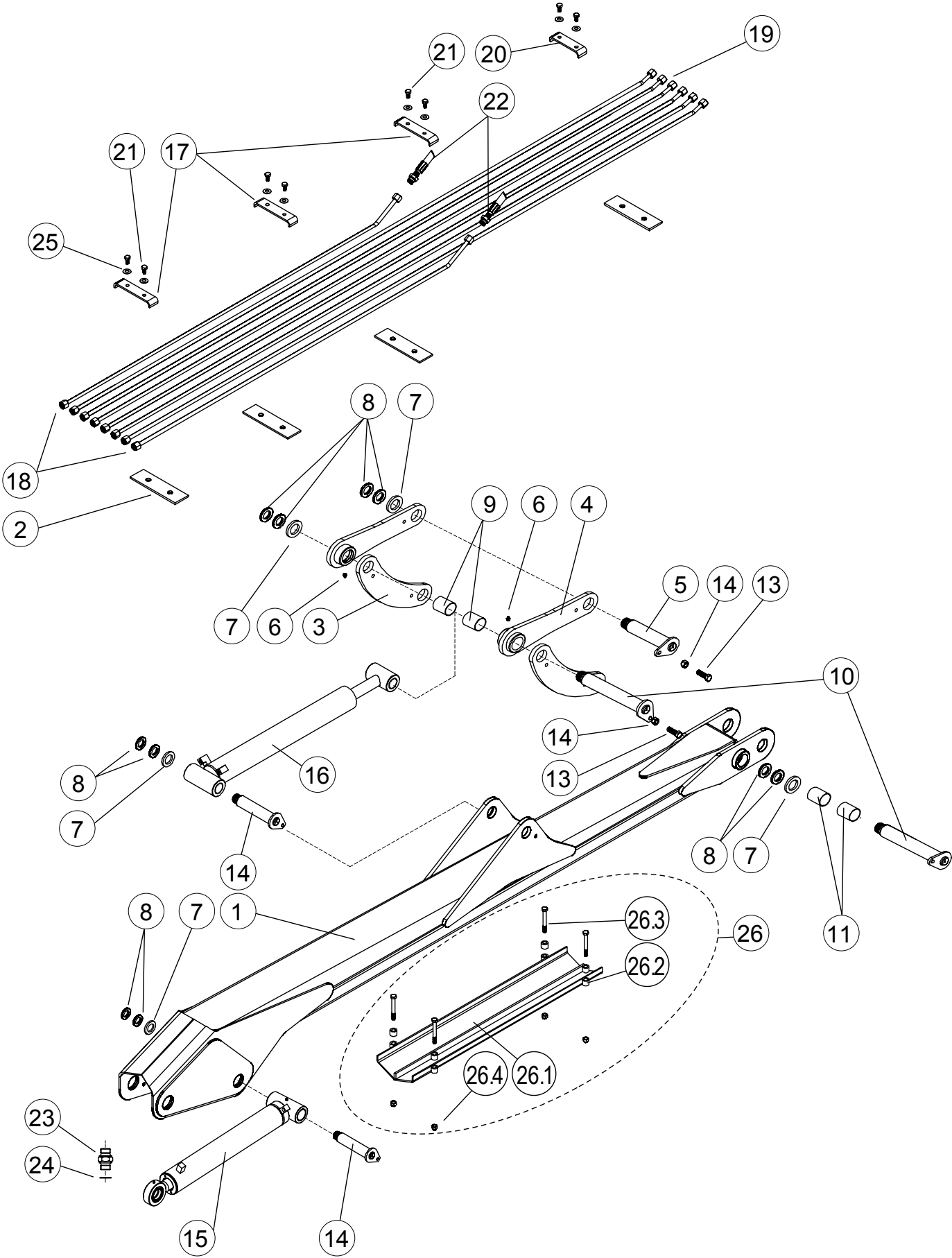
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SLEWING DEVICE

Part	Order no	Description	Remarks	Qty
1	13465500	Frame		1
2	54567029	Slide bearing		1
3	33465400	Column		1
4	43460237	Plate		1
5	23465560	Rack		2
6	43465520	Cylinder tube		4
7	43465550	Lock nut		4
8	54562160	Slide bearing		2
9	58217654	Seal		4
10	52230224	Circlip	75X2,5 DIN471	1
11	52060514	Screw	M10X20 DIN933 88ZN	6
12	52401015	Grease nipple	AR1/8	6
13	43465540	Footstep bearing		2
14	54522313	Tapered roller bearing		1
15	52302734	O-ring		1
16	43590650	Pin		1
17	52118080	Axle nut	M40X1,5	4
18	43592850	Pin		1
19	52390200	Usit-ring		2
20	43390889	Washer	70X70	1
21	52062031	Screw	M12X40 DIN933 8.8ZN	1
22	52117124	Lock nut	M12 DIN985 8.8ZN	1
23	56520083	Hose assy	S3/8"S L=0,65 m	2
24	56520059	Hose assy	S3/8"S L=0,5 m	2
25	33391335	Hose fastener		3
26	52443678	T-nipple	R3/8	2
27	52063674	Screw	M20X1,5X100 DIN960 109	8
28	52117215	Lock nut	M20X1.5,10.9 DIN985	8
29	43393270	Hose fastener		1
30	43391937	Screw	95	2
31	52110046	Nut	M10 DIN934 8ZN	2
32	52117108	Lock nut	M10 DIN985 8ZN	2
33	52200045	Washer	M10 DIN126 58ZN	8
34	56571040	Hose assy	6SP 1/8 6SP L=0,5	1
35	52422011	Angle nipple	CLL-06 R 1/8	1
36	52421013	Nipple	BL-06 R 1/8	1
37	43463140	Locating screw		2

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LIFTING BOOM



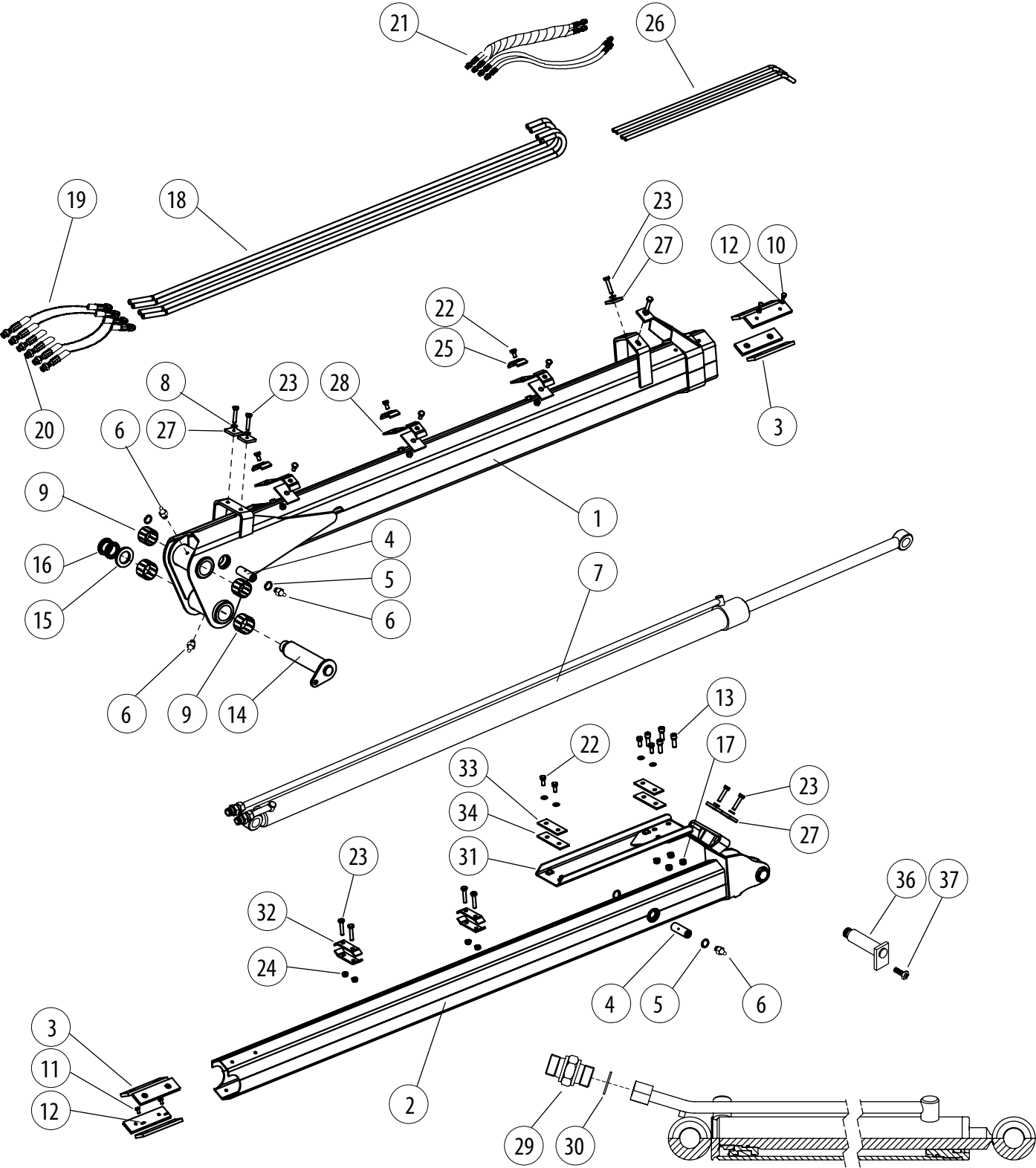
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LIFTING BOOM

Part	Order no	Description	Remarks	Qty
1	33465200	Lifting boom		1
2	43493170	Rubber	5X50X170	4
3	43465260	Shaft		2
4	43465270	Shaft		2
5	43465290	Pin	D50	1
6	52401015	Grease nipple	AR1/8	5
7	43390889	Washer	70X70	5
8	52118080	Axle nut	M40X1,5	10
9	54566000	Slide bearing		2
10	43465310	Pin		2
11	54562194	Slide bearing		2
12	52062031	Screw	M12X40 DIN933 88ZN	1
13	52117124	Lock nut	M12 DIN985 8ZN	1
14	33465490	Pin		2
15	56097280	Lifting cylinder	90/50-575	1
15.1		Seal kit		1
16	56097290	Folding cylinder	90/50-650	1
16.1		Seal kit		1
17	43493190	Pipe fastener		3
18	43591880	Hydraulic pipe	1630	2
19	43591890	Hydraulic pipe	2800	6
20	43493180	Pipe fastener		1
21	52060514	Screw	M10X20 DIN933 88ZN	8
22	56570443	Hose assy	S 3/8 SPT12 L=0,30 m	2
23	52432028	Double fitting	R3/8	4
24	52390556	Usit-ring	U17,28X23,8X2,03	4
25	52214251	Washer	M10 NORD-LOCK	8
26	43594330	Cover	complete, accessory	1
26.1	43594270	Cover		1
26.2	43110162	Bushing		4
26.3	52062494	Screw	M12X100 DIN931 88ZN	4
26.4	52117124	Lock nut	M12 DIN985 8ZN	4

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FOLDING BOOM



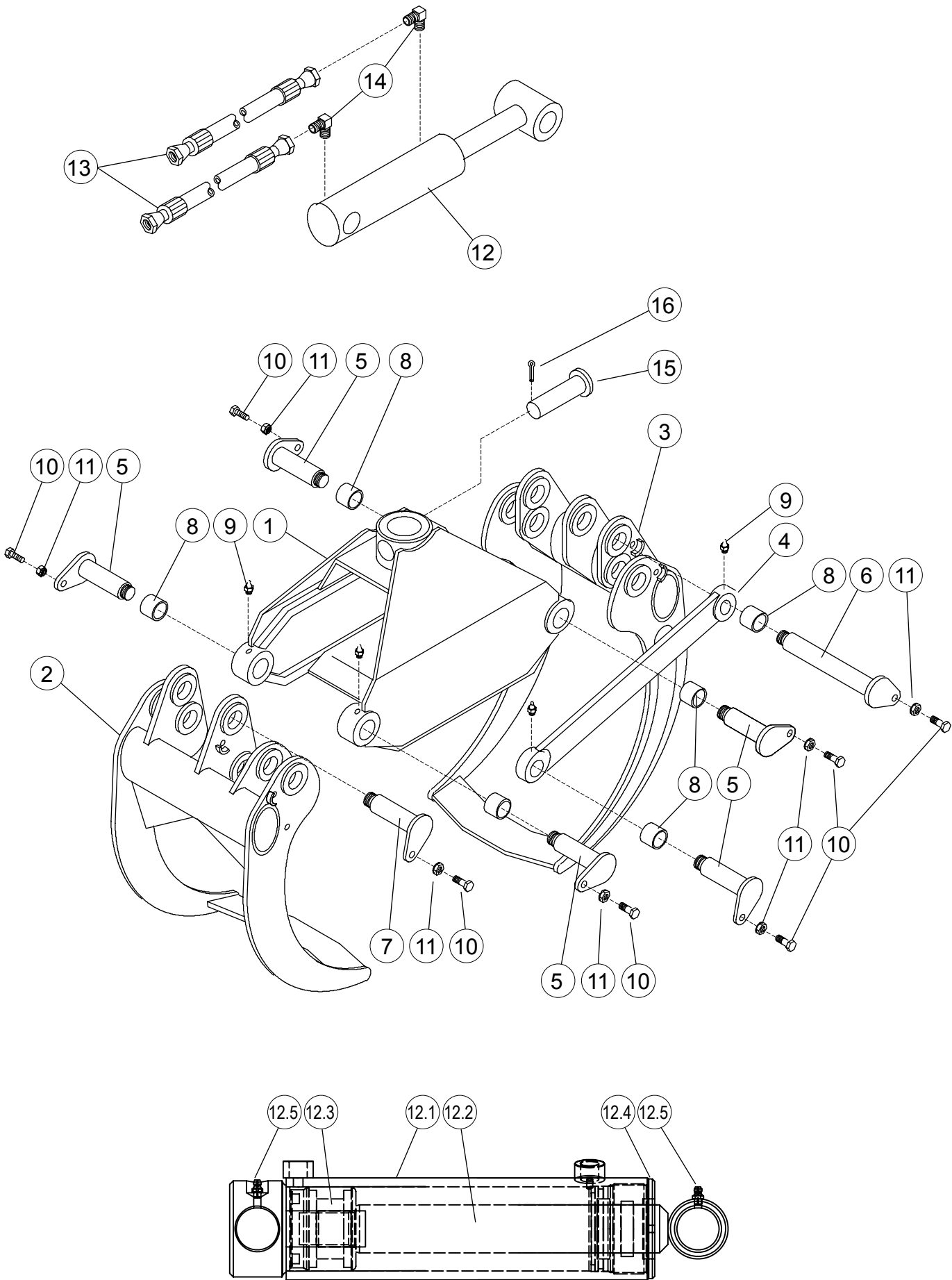
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FOLDING BOOM

Part	Order no	Description	Remarks	Qty
1	33465100	Folding boom		1
2	33465050	Extension boom		1
3	43286871	Slide plate		8
4	43390814	Pin		2
5	52231040	Circlip	28x1,2 DIN472	4
6	52401015	Grease nipple	AR1/8	4
7	56098080	Extension cylinder	40/25-1600	1
8	52214251	Washer	M10 NORD-LOCK	16
9	54562194	Slide bearing	PM 5040 DX CLACIER	4
10	52060118	Screw	M8x16 DIN933 88ZN	8
11	52060120	Screw	M8x14 DIN933 88ZN	8
12	52114311	Lock washer	M8 NORD-LOCK	16
13	52070400	Hexagonal socket head screw	M12X35 DIN912 88ZN	4
14	33465490	Pin		1
15	43390889	Washer		1
16	52118080	Axle nut	M40X1,5	2
17	52117124	Lock nut	M12 DIN985 8ZN	4
18	43595150	Hydraulic pipe		4
19	56570401	Hose assy		4
20	56570435	Hose assy		2
21	56570550	Hose assy		4
22	52060514	Screw	M10X20 DIN933 88ZN	10
23	52060266	Screw	M10X50 DIN931 88ZN	10
24	52117108	Lock nut	M10 DIN985 8ZN	4
25	43391440	Pipe fastener		6
26	43595160	Hydraulic pipe		4
27	43493730	Fastener		6
28	43392059	Rubber		6
29	52432028	Double fitting	R3/8	2
30	52390556	Usit-ring		2
31	43492450	Fastener		1
32	43493040	Plate		4
33	43493200	Plate		2
34	43493510	Rubber		2
35	55308030	Cross link		1
36	43465670	Pin		1
37	52001310	Hexagonal socket head screw	M16X20 DIN912 88ZN	1

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23595050 GRAPPLE PTK21S



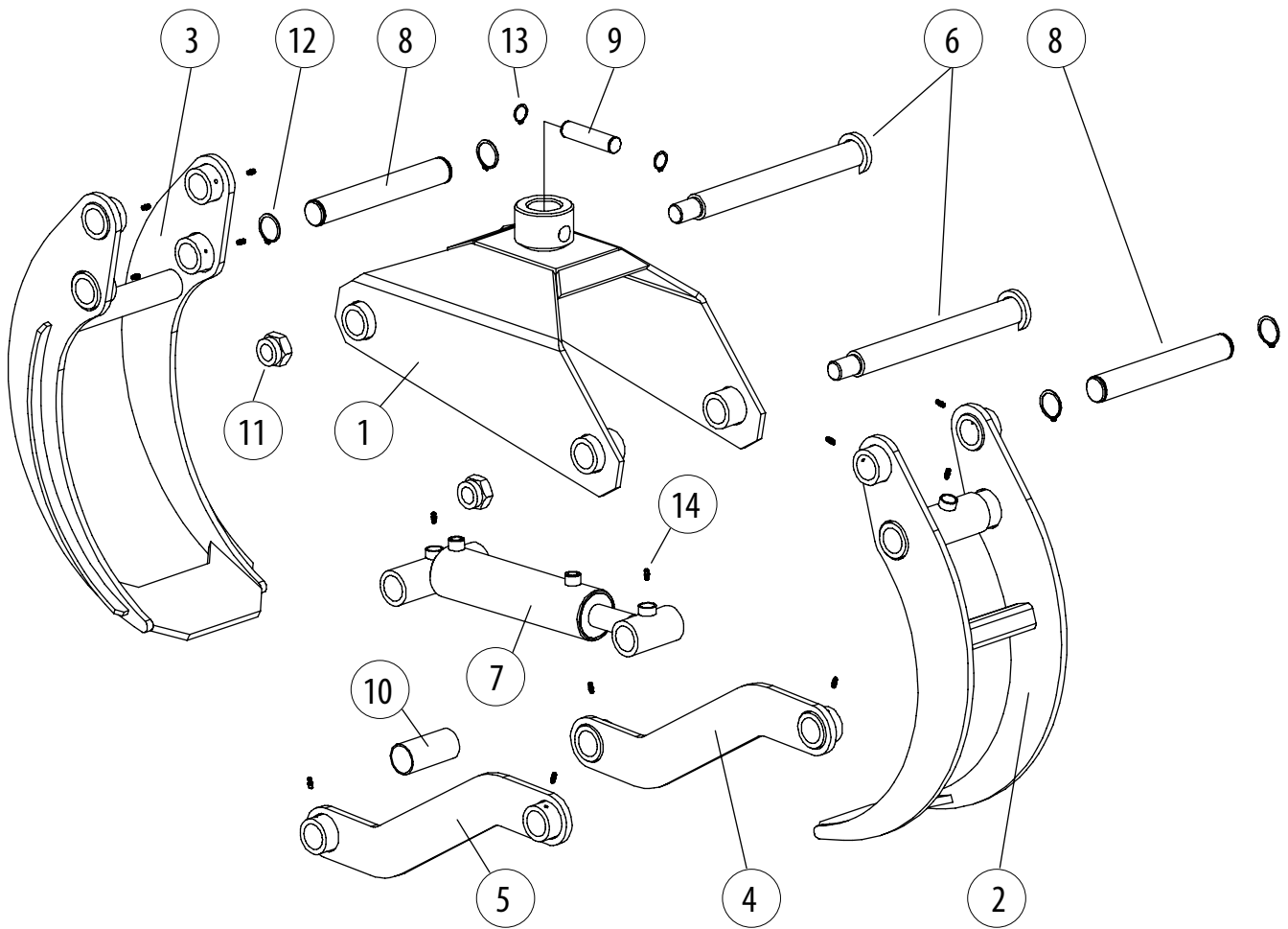
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23595050 GRAPPLE PTK21S

Part	Order no	Description	Remarks	Qty
1	43595310	Frame		1
2	13282058	Inner jaw		1
3	13282090	Outer jaw		1
4	23282023	Lever		1
5	43281930	Pin		5
6	43281955	Pin		1
7	43281971	Pin		1
8	54561287	Slide bearing		6
9	52401015	Grease nipple	AR1/8	6
10	52060233	Screw	M10X30 DIN933 88ZN	7
11	52117108	Lock nut	M10 DIN985 8ZN	7
12	56097220	Cylinder	70/40-196	1
12.1	58222350	Cylinder tube		1
12.2	58222360	Piston rod		1
12.3	58222370	Piston		1
12.4	58222380	Guide		1
12.5	52401015	Grease nipple	AR1/8	2
12.6	58222390	Seal kit		1
13	56520075	Hose assy	S3/8"S L=0,6 m	2
14	52442357	Angle nipple	RK3/8-R3/8 UK 90o	2
15	43091123	Pin		1
16	52840311	Cotter pin	6X60 DIN1481	1

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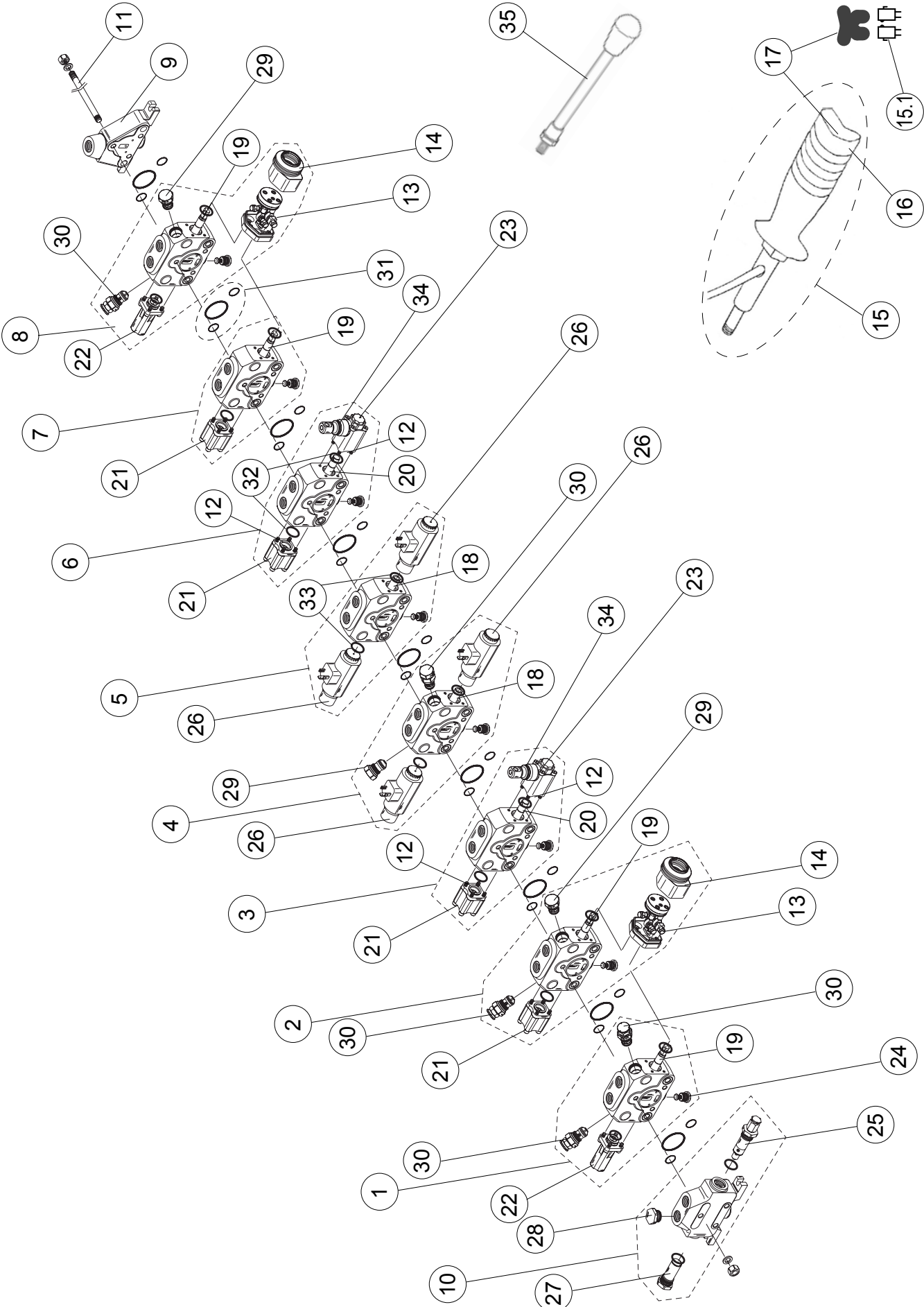
GRAPPLE PTK020



Part	Order no	Description	Remarks	Qty
1	58221130	Frame		1
2	58221140	Inner jaw		1
3	58221150	Outer jaw		1
4	58221160	Lever	left	1
5	58221170	Lever	right	1
6	58221180	Pin		2
7	58221190	Cylinder		1
7.1	04080700	Seal kit		1
8	58221200	Pin		2
9	58221310	Pin		1
10	58221320	Bushing	D48,3X2,3-100	1
11	52117306	Lock nut	M30 DIN985 8ZN	2
12	52230281	Circlip	40x1,75 DIN471	4
13	52230315	Circlip	25X1,2 DIN471	2
14	52401023	Grease nipple	AM6	13

FARMI 4670

03462820 LEC2/6+2 ON/OFF, 60 l



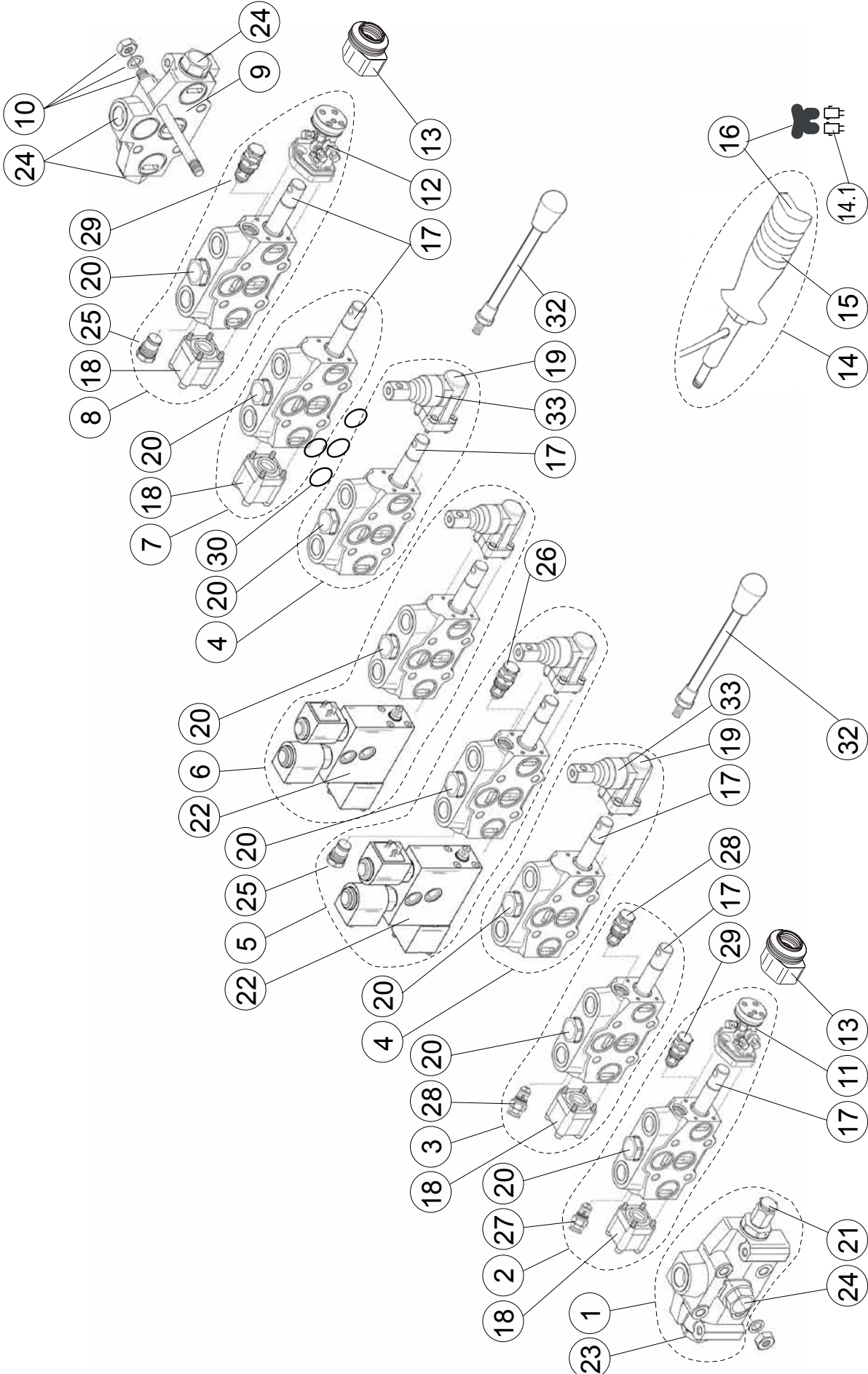
FARMI 4670

03462820 LEC2/6+2 ON/OFF, 60 l

Part	Order no	Description	Remarks	Qty
1	58222680	Working section		1
2	58222690	Working section		1
3	58222700	Working section		1
4	58222710	Working section		1
5	58222720	Working section		1
6	58222700	Working section		1
7	58222730	Working section		1
8	58222740	Working section		1
9	58222530	Outlet section		1
10	58222500	Inlet section		1
11	58222490	Tie rod kit		1
12	52301470	Retaining ring		4
13	58222480	Joystick control, right and left		1
14	55140910	Protective rubber	for joystick control	2
15	55150254	Joystick		2
15.1	55131050	Micro switch		2
16	58217795	Protective rubber	for joystick	2
17	55138500	Tumbler switch		2
18	58222820	Spindle	sections 4 + 5	2
19	58222830	Spindle	sections 1+2+7+8	4
20	58222840	Spindle	sections 3+6	2
21	58222290	Spool return action	sections 2+3+6+7	4
22	58222450	Spool return action, floating	sections 1+8	2
23	58222300	Lever actuation		2
24	58222305	Check valve kit		8
25	58222280	Main pressure relief valve	adjustable	1
26	58222600	Electrical control		4
26.1	58222870	Tube + nut		4
27	58222610	Plug		1
28	58222615	Plug	1/2"	1
29	58222620	Plug		3
30		Antishock valve	see the separate table	5
31	58222210	Seal kit	between the sections	9
32	58222230	Seal kit for spindle	sections 1+2+3+6+7+8	6
33	58222220	Seal kit for spindle	sections 4+5	2
34	58231670	Protective rubber	sections 3+6	2
35	58223290	Lever	135 mm	2
	55126020	Electrics		1
Part	Order no	Description	Remarks	Qty
	58222250	Antishock valve	80 bar	
	58222260	Antishock valve	160 bar	
	58222240	Antishock valve	175 bar	
	58222245	Antishock valve	190 bar	
	58222255	Antishock valve	240 bar	

FARMI 4670

03595320 LEC 2/6+2 ON/OFF, 80 I



FARMI 4670

03595320 LEC 2/6+2 ON/OFF, 80 l

Part	Order no	Description	Remarks	Qty
1	58231400	Inlet section		1
2	58231420	Working section	section 1	1
3	58231410	Working section	section 2	1
4	58231440	Working section	sections 3+6	2
5	58231630	Working section	section 4	1
6	58231640	Working section	section 5	1
7	58231460	Working section	section 7	1
8	58231450	Working section	section 8	1
9	58231470	Outlet section		1
10	58231480	Tie rod kit		4
11	58231490	Joystick control, left		1
12	58231500	Joystick control, right		1
13	55140910	Protective rubber	for joystick control	2
14	55150254	Joystick		2
14.1	55131050	Micro switch		2
15	58217795	Protective rubber	for joystick	2
16	55138500	Tumbler switch		2
17	58231590	Spindle	sections 1-8	8
18	58231510	Spool return action	sections 1-3, 6-8	6
19	58231520	Lever actuation	sections 3-6	4
20	58231530	Check valve kit		8
21	58222280	Main pressure relief valve	175 bar	1
22	58231650	On/off control		2
23	58222610	Plug		1
24	58231580	Plug		4
25	58231540	Plug		2
26	58231550	Antishock valve	90 bar	1
27	58222260	Antishock valve	160 bar	1
28	58231560	Antishock valve	185 bar	2
29	58231570	Antishock valve	200 bar	2
30	58222790	Seal kit		9
31	58222800	Seal kit for spindle		8
32	58231660	Lever		2
33	58231620	Protective rubber		2
	55126020	Electrics		1

WARRANTY

Farmi Forest Oy grants a 12-month warranty on all of its products, covering material and manufacturing faults. The warranty comes into effect on the product's delivery date.

The manufacturer is not liable for damages caused by:

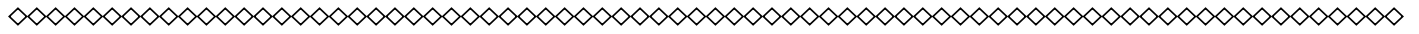
- misuse of the product
- alterations or repairs made without the manufacturer's permission
- insufficient maintenance
- non-original parts

The warranty does not cover wearing parts.

Send faulty parts, carriage paid, to the manufacturer for inspection. Repairs will be conducted by Farmi Forest Oy or an authorized expert. The warranty is valid only if the bottom part of this page is filled in and returned to the manufacturer within 14 days of receipt of the product. By returning the warranty certificate, you confirm that you have read and understood the instruction manual that came with the product.



Farmi Forest Corporation
Ahmolantie 6
FIN-74510 IISALMI
FINLAND



PRODUCT REGISTRATION FORM

Date of delivery: ____/____ 20____

Dealer: _____

Dealer's address: _____

Dealer's tel: _____

Product and type: _____

Serial number: _____



Return to the manufacturer



Date of delivery: ____/____ 20____

Dealer: _____

Dealer's address: _____

Dealer's tel: _____

Customer: _____

Customer's address: _____

Customer's tel: _____

E-mail: _____

Product and type: _____

Serial number: _____





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