OPERATING INSTRUCTIONS

DINO®

160XT
180XT
210XT

Manufacturer:

DINOlift
UP TO THE JOB
Raikkolantie 145
FI-32210 LOIMAA
Tel. +358 20 1772 400
info@dinolift.com
www.dinolift.com

Dealer:

TRANSLATION OF THE ORIGINAL OPERATING INSTRUCTIONS

Valid from serial number

160XT	**16931,17008 ->**
180XT	**19029,19034 ->**
210XT	**3265 ->**

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1 EU Declaration of Conformity

Manufacturer:

Dinolift Oy
Raikkolantie 145
FI-32210 Loimaa, FINLAND

which has authorised the Chief Engineer Mr. Seppo Kopu, Dinolift Oy, Raikkolantie 145, 32210 Loimaa, FINLAND, to draw up the Technical Construction File,

declares that

DINO 160XT Aerial Work Platform no YGC D160XT X X XXXXX
DINO 180XT Aerial Work Platform no YGC D180XT X X XXXXX
DINO 210XT Aerial Work Platform no YGC D210XT X X XXXXX

complies with the provisions of the Machine Directive 2006/42/EC and its amendments as well as the national decree (VNA 400/2008), through which they have been brought into effect as well as the regulations of the Low Voltage Directive 2000/14/EC, the Directive 2000/14/EC and the EMC Directive 2004/108/EC

To the assessment procedure of conformity has been applied: 2000/14/EC, Annex V: Internal control of production.

Measured sound power level Petrol/Diesel L_{wa} (96 + 1,5) 97,5 / (98,5+1,5) 100 dB

Guaranteed sound power level Petrol/Diesel L_{wa} (97.5 + 0,5) 97,5 / (100+0,5) 100 dB

Notified body no. 0537,

VTT
P.O.Box 1300
FI-33101 Tampere
FINLAND

has granted the certificate no.**VTT 176 / 524 / 09**

In designing the machine, the following harmonised standards have been applied:

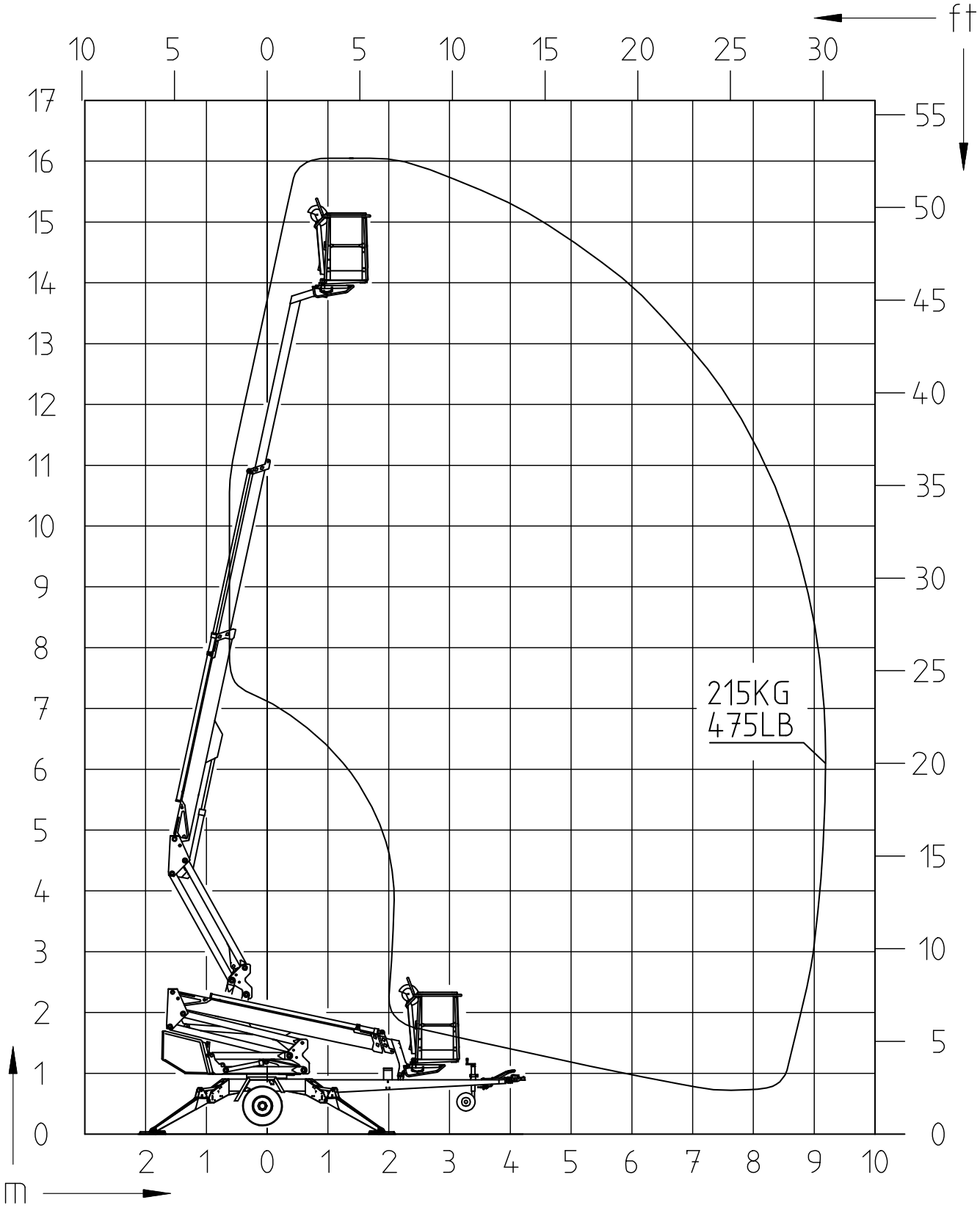
SFS-EN 280/A1+A2; SFS-EN 60204-1/A1

Loimaa**XX.XX.XXXX**
(place) (date)

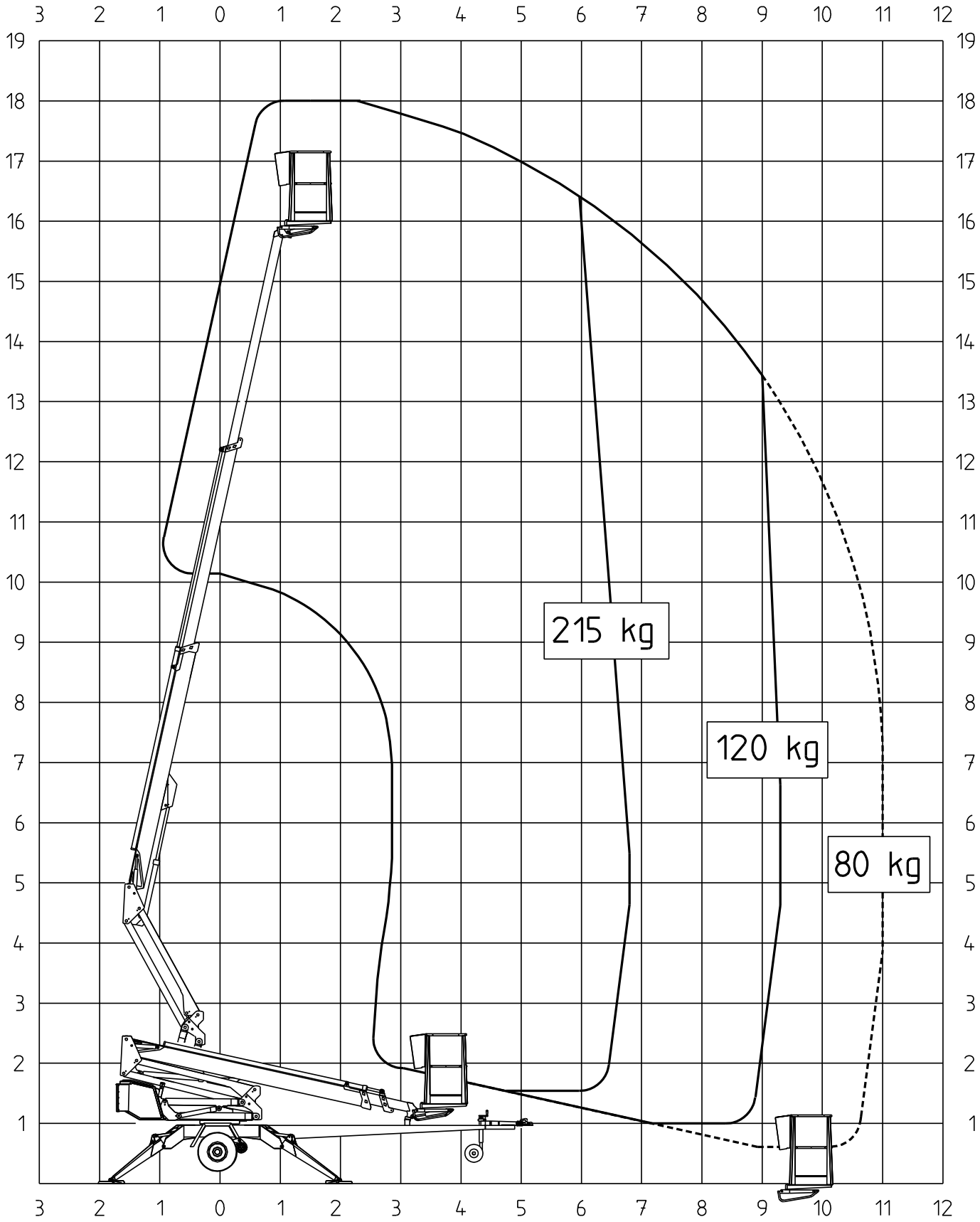
(signature)
Seppo Kopu
Chief Engineer
(name in block letters, position)

2 REACH DIAGRAM

2.1 160XT

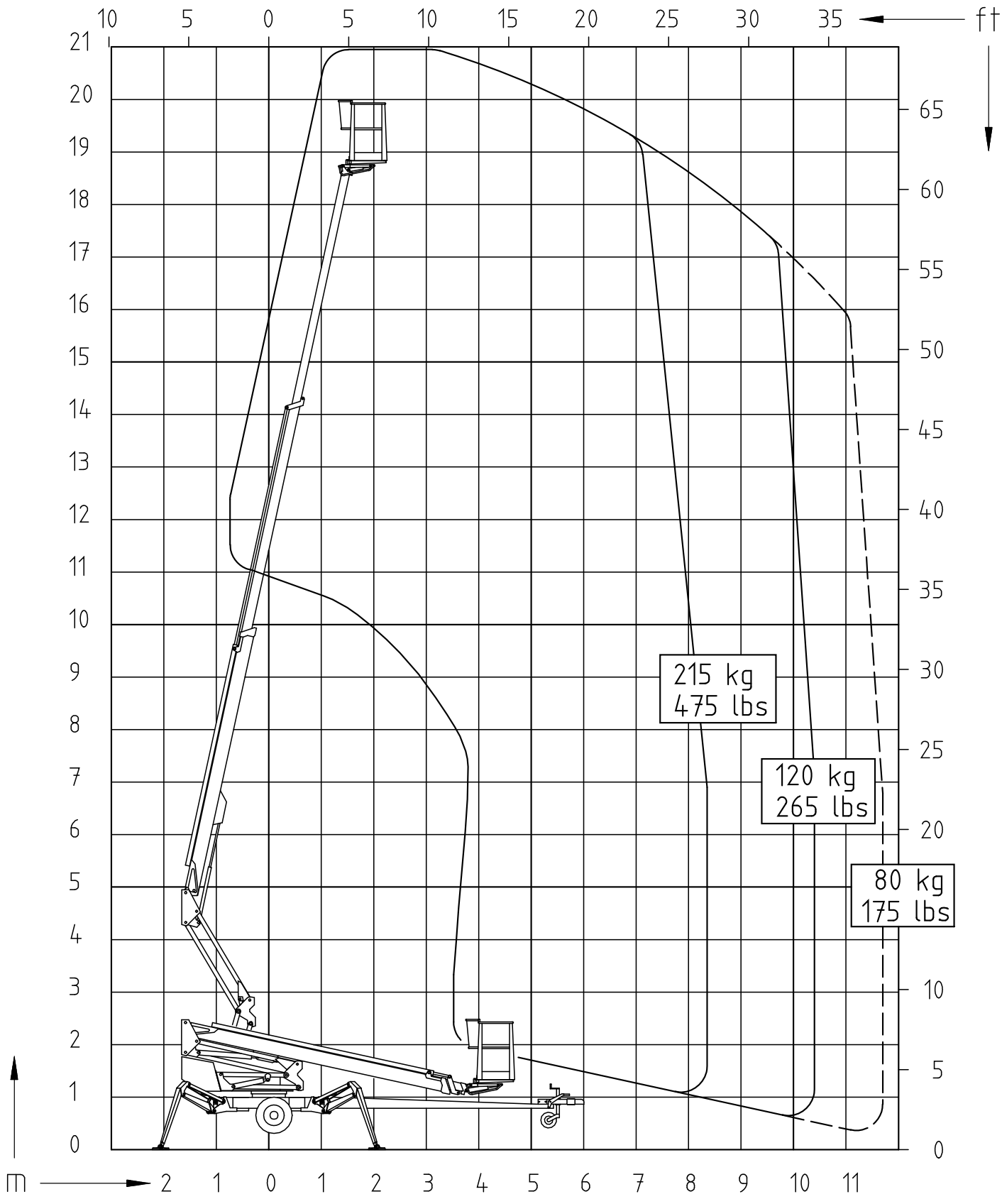


2.2 180XT



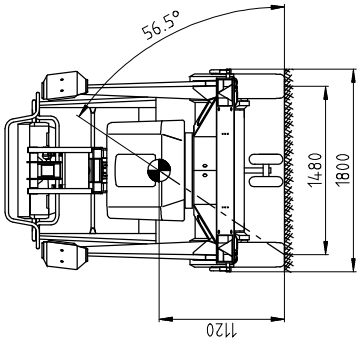
DINOlift UP TO THE JOB

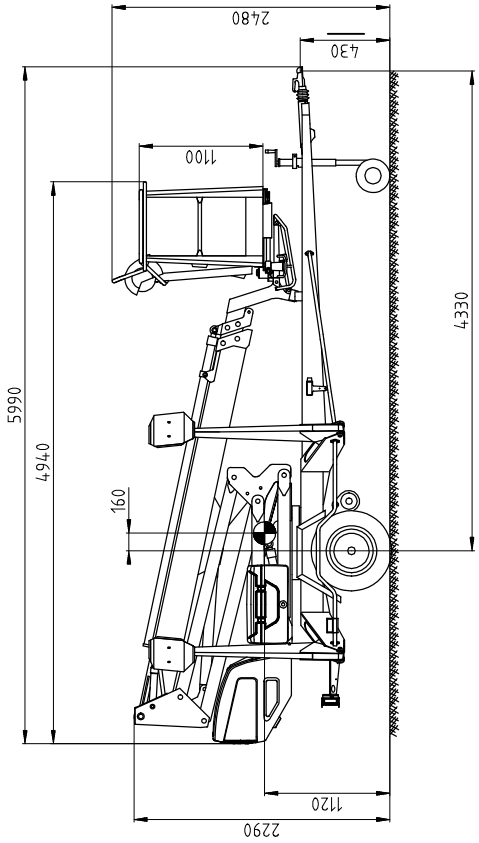
2.3 210XT

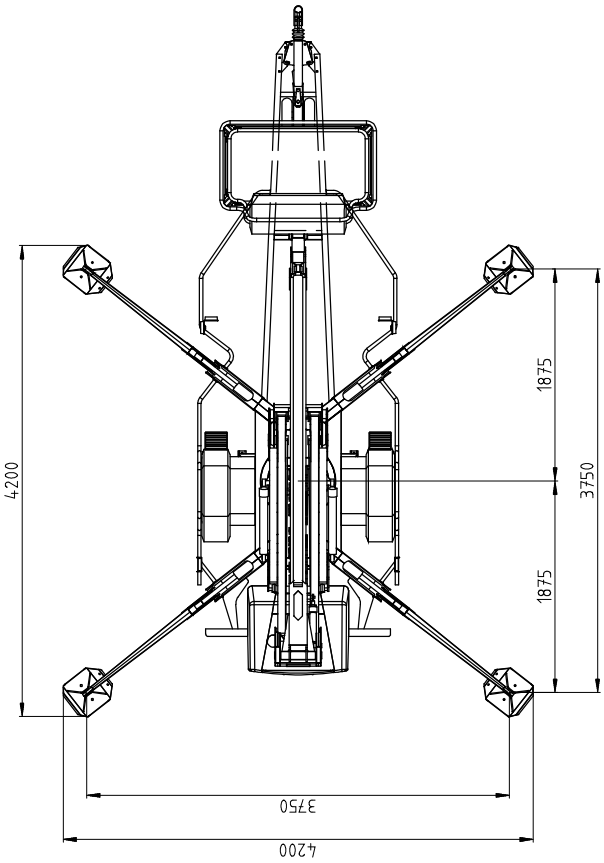


3 DIMENSION DRAWING

3.1 160XT







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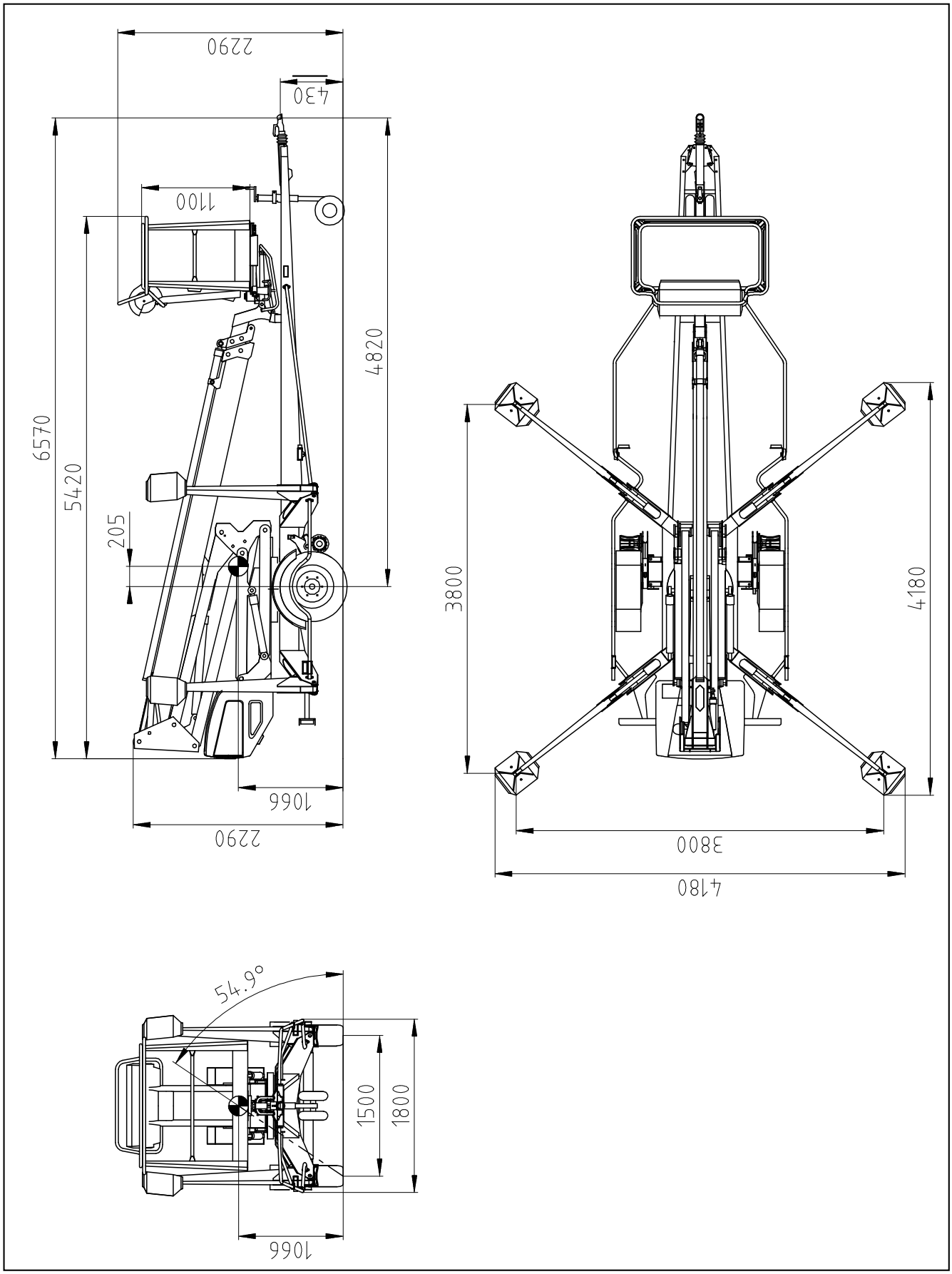
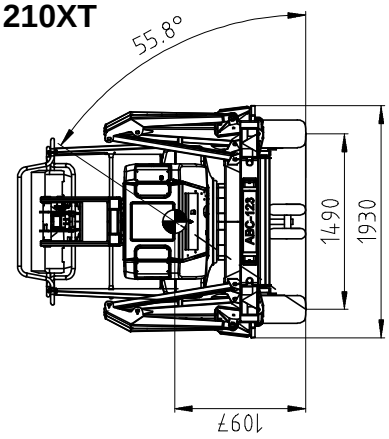
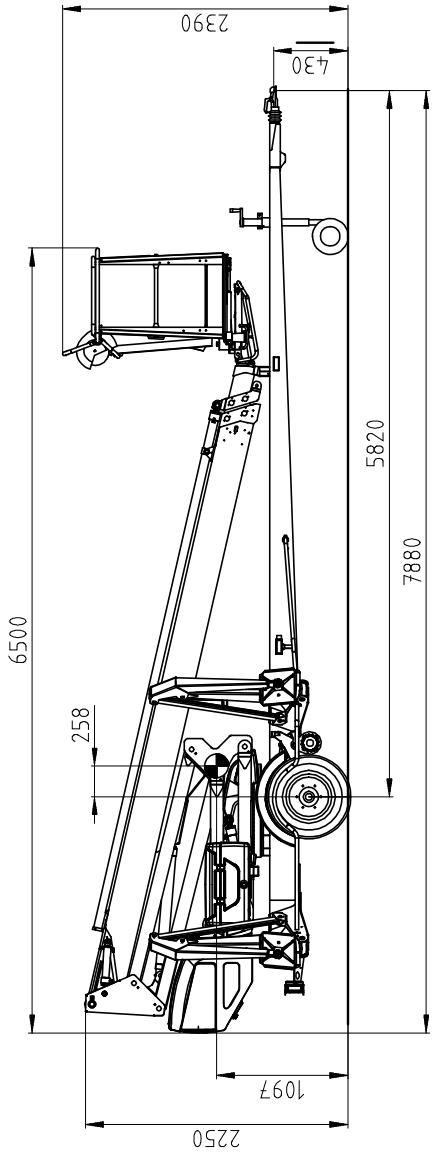

2290
430
1100
6570
5420
4820
205
1066
2290
3800
4180
3800
4180
54.9°
1500
1800
1066

3.3 210XT


55.8°
1490
1930
1097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6500
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1097
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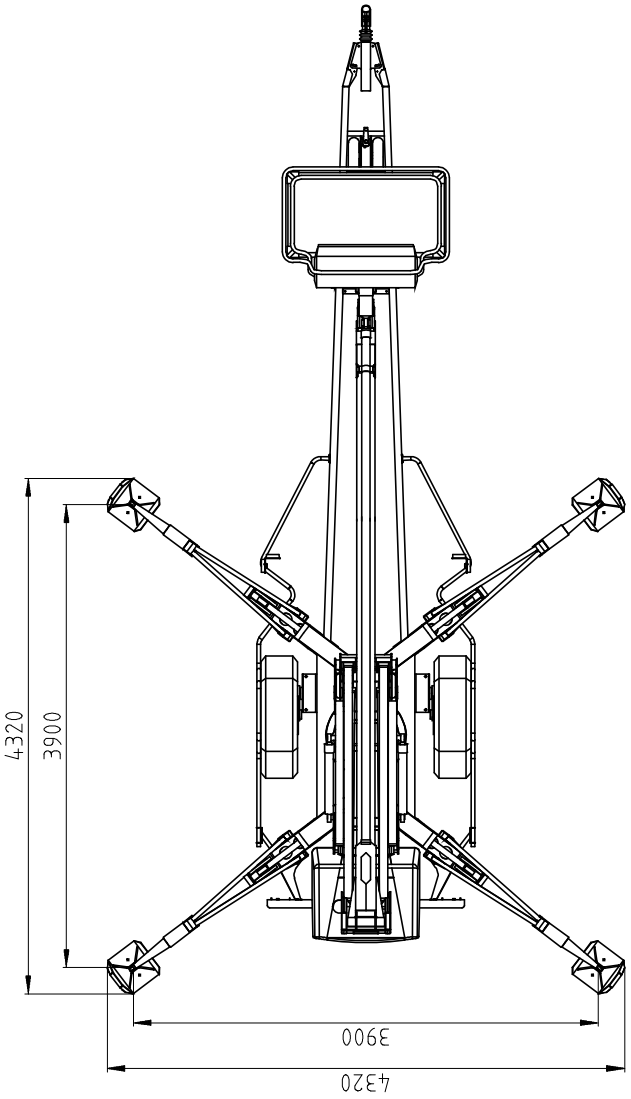
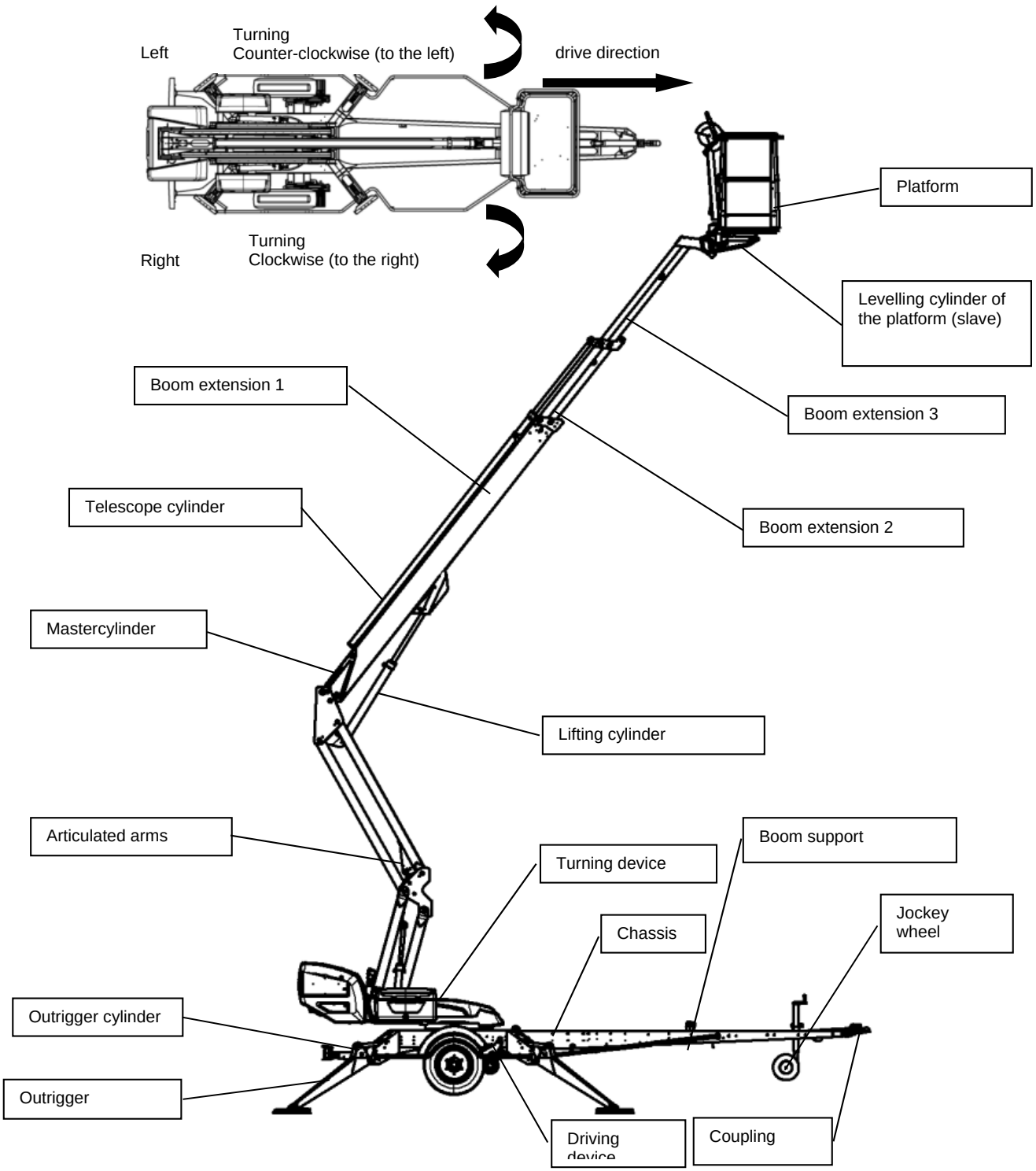

4320
3900
3900
4320

4 TECHNICAL SPECIFICATION

	160XT	180XT	210XT
Max. working height	16.0 m	18.0 m	21.0 m
Max. platform height	14.0 m	16.0 m	19.0 m
Max. outreach	9.1 m	10.9 m	11.7 m
Boom rotation	continuous		
Platform rotation	90°		
Turn area	refer to the reach diagram		
Support width	3.80 m	3.80 m	4.30 m
Transport width	1.78 m	1.78 m	1.92 m
Transport length	5.91 m	6.55 m	7.88 m
Transport height	2.20 m	2.20 m	2.18 m
Weight (incl. Honda power unit)	1,990 kg	2,115 kg	2,465 kg
Max. allowed load on platform	215 kg		
Max. number of persons + additional load	2 persons + 55 kg		
Max. allowed sideways load (caused by persons)	400 N		
Max. lateral inclination (chassis)	±0,3°		
Max. wind speed during operation	12,5 m/s		
Min. ambient temperature when working	-20 °C		
Max. support force on the outriggers	16,800 N	16,800 N	22,800 N
Platform size	0.7 x 1.3 m		
Gradeability	25 %		
Power supply			
• mains current	230V/50Hz/10A		
Sound pressure level	Under 70 dB		
• petrol-driven power unit (option)	4.8 kW (6.5 hp)/3,600 rpm		
Sound pressure level	98 dB		
• diesel-driven power unit (option)	4.4 kW (6 hp)/2,800 rpm		
Sound pressure level	101 dB		
Socket outlets on the platform	230V/50Hz/16A		

4.1 General description of the machine

The denominations of the machine's essential parts and concepts, which are used later in these instructions, are described on this page.

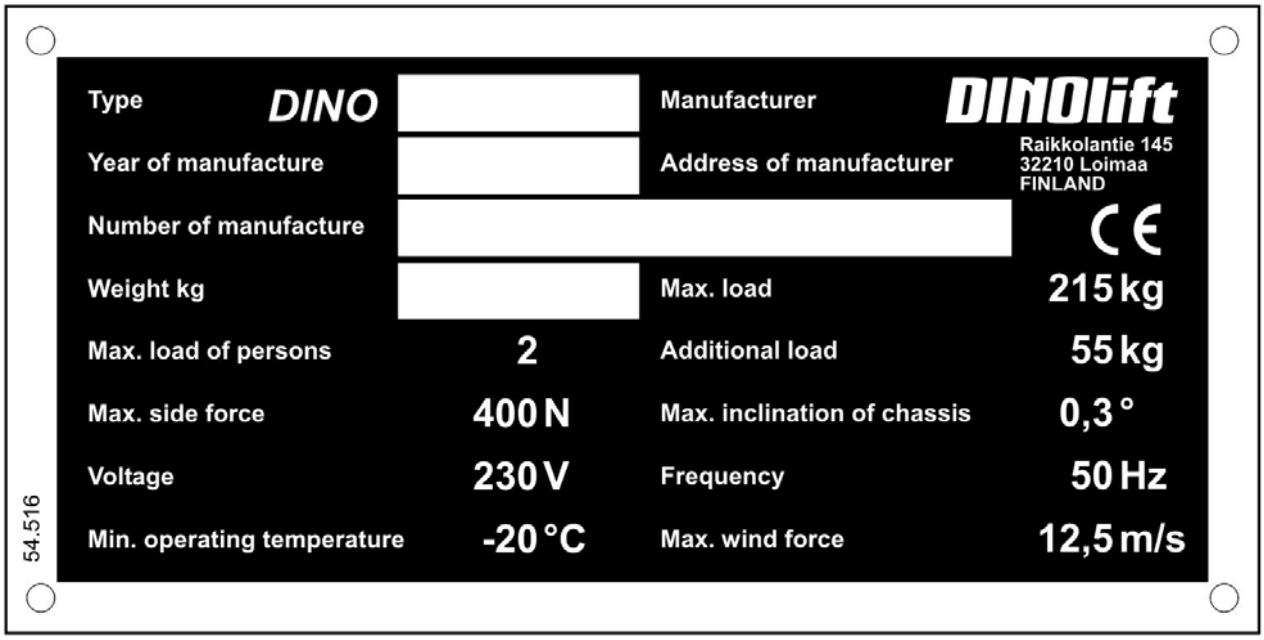


4.2 Description of the machine's intended use

The intended use of the Aerial Work Platform is exclusively limited to transferring people and tools and acting as a work platform within its permissible load-bearing capacity and reach (refer to the table "Technical Specifications" and the "Reach Diagram").
The intended use also covers:

- Following all the instructions in the Operating Instructions
- Performance of the inspections and maintenance operations

4.3 Example of the machine's nameplate



5 GENERAL SAFETY REGULATIONS

Make yourself familiar with these operating instructions before using the lift!

- Keep these operating instructions in the place reserved for them.
- Make sure that all users of the lift are familiar with these instructions.
- Advise new users and strictly follow all instructions given by the manufacturer.
- Make sure you clearly understand all instructions relating to the operational safety of the lift.

Always use chocks under the wheels when disconnecting the lift from the car.

Only specially trained personnel with authorisation in writing, who are well familiarised with the device, and at least 18-years old, are allowed to operate the unit.

- The max. allowed load on the platform is two (2) persons and at maximum fifty five (55) kg of additional load, however, the total load must not exceed two hundred fifteen (215) kg.
- The platform may only be operated when the chassis is well supported, and the wheels are off the ground.
- The load-bearing capacity and the gradient of the base must be taken into account when supporting the chassis.
- Additional support plates of adequate size must be used under the outriggers, when working on soft ground. Only use such additional support plates, on which the metallic outriggers will not slide.

The lift may only be moved in the transport position. No persons or load are allowed on the platform during the transportation.

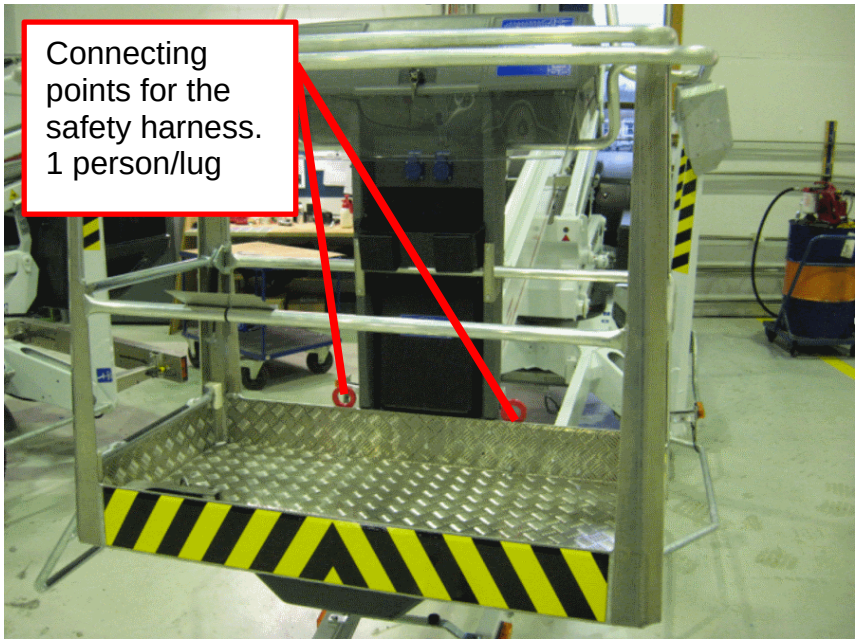
The weather conditions, such as wind, visibility and rain, must always be taken into account so that these will not adversely affect safe performance of the lifting operations.

The use of the lift is prohibited if

- **the temperature drops under -20 °C** or
- **the wind speed exceeds 12.5 m/s**

Protect your hearing while using the power unit (option)(92 dB)

Use the safety harness



Do not use ladders, steps or other similar equipment on the platform.

Never throw any objects from the platform.

The lift must not be used for transferring goods or persons between different floors or working levels.

Never disable the operation of any safety device.

Always make sure, before lowering the platform, that the area on the underside is clear of any obstructions.
Avoid damaging the platform by lowering it on the ground, or bringing it in contact with any structures.

When working in busy areas, the operating range of the lift must be clearly marked by using either warning lights or fencing.
Also observe the regulations of the Road Traffic Act.

Beware of the live aerial power lines in the area – observe the minimum safety distances:

Voltage	Min. distance below (m)	Min. distance at the side (m)
100 – 400 V hanging spiral cable	0.5	0.5
100 – 400 V open-wire cable	2	2
6 - 45 kV	2	3
110 kV	3	5
220 kV	4	5
400 kV	5	5

Keep the lift free of any dirt, which may impair safe operation, and impede the inspection of the structures.

The device must be serviced and inspected regularly.
Only skilled persons, familiar with the service and repair instructions, are allowed to carry out servicing and repair work.

It is strictly prohibited to use a lift which is out of order.

The device must neither be altered without the manufacturer's consent nor be used under conditions, which do not meet the manufacturer's requirements.

The operator must be given instructions and consent from the manufacturer for all such specific work methods or conditions that the manufacturer has not explicitly defined.

5.1 Instructions for safe operation

- **Use a safety harness while on the platform.**
- **Use hearing protectors when operating the power unit. Sound pressure level at the lower control unit 92 dB.**
- **Never add load onto the platform while in the upper position.**
- **The lift must not be used when the temperature is below -20°C, and the wind speed exceeds 12.5 m/s.**
- **Beware of live power lines within the work area.**
- **The lift MUST NOT be used as a crane.**
- **Always ensure the load-bearing capacity of the standing surface.**
- **Ensure the unobstructed range of movement before operating the outriggers.**
- **While in the support position, ensure that the wheels are off the ground.**
- **Always verify the horizontal position of the machine.**
- **Ensure that the outriggers cannot slide while on a gradient.**
- **Always ensure that the work area is clear of outsiders. Danger of getting squeezed between rotating and fixed structures.**
- **Stepping on or off the platform in motion is prohibited.**
- **The maximum-allowed gradient during transfers is 5°. During transfer in rough terrain, try to stay above the machine.**
- **While operating the boom from the control centre on the turning device, beware of getting pressed against the outriggers or other structures that do not turn with the boom.**
- **When the boom is in its lowest positions, make sure it cannot clash during rotation with structures that do not turn with the boom.**
- **Before operating, always ensure that the safety devices and the emergency descent system are in working order.**
- **Do not take tools/material of large surface area onto the platform. The increase in wind load may jeopardize the stability of the device.**
- **Always keep the lift free from dirt, snow and ice.**
- **Ensure that the lift is inspected and serviced, before use.**
- **Never use a defective lift.**
- **Never use a lift alone. Make sure that there is always someone on the ground, who can call for help in case of an emergency.**

6 INSPECTIONS

A thorough inspection of the lift must be carried out at least once every twelve (12) months.

The inspection shall be carried out by a technically trained person who is familiar with the operation and structure of the lift.

Draw up a protocol of the inspections and always keep it with the unit stored in the space reserved for it.

Carry out the inspections regularly throughout the service life of the lift.

The inspection must be carried out within twelve (12) months of the first inspection or previous regular inspection.

If the lift is used under extreme conditions, intervals between the inspections shall be reduced.

The overall operating condition of the lift as well as the condition of the safety-related control devices shall be established in the regular inspections. Particular attention shall be paid to changes, which affect the operational safety.

In connection with the regular inspection shall be established to what extent the lessons and practical experience gained since the previous inspection could be utilized to improve the safety even more.

National legislation must be followed first of all.

Regular inspections and service measures are described more thoroughly in the chapter “Service- and maintenance”.

7 WORKSITE INSPECTION

1. General information

- Is the lift suited for the intended job?
- Is the performance of the lift sufficient for the job? (reach, loadability etc.)
- Is the position of the lift safe?
- Is the lighting on the worksite sufficient?

2. Documents

- Are the Operation and Service Instructions for this lift present? (Manufacturer´s instructions)
- Are inspections and servicing carried out in accordance with the instructions and have the defects affecting the safety been checked as repaired? (Inspection protocols)

3. Structure (Visual inspection and operational test)

- General condition of the lift
- Operation and protection of the controls
- Emergency stop, signal horn and limit switches
- Electrical appliances and wiring
- Oil leaks
- Load markings and signs

4. Operator

- Is the operator old enough?
- Has the operator received the required training?

5. Special issues on the worksite

- Are there any additional regulations relevant to the worksite or the work?

8 OPERATION OF THE SAFETY DEVICES

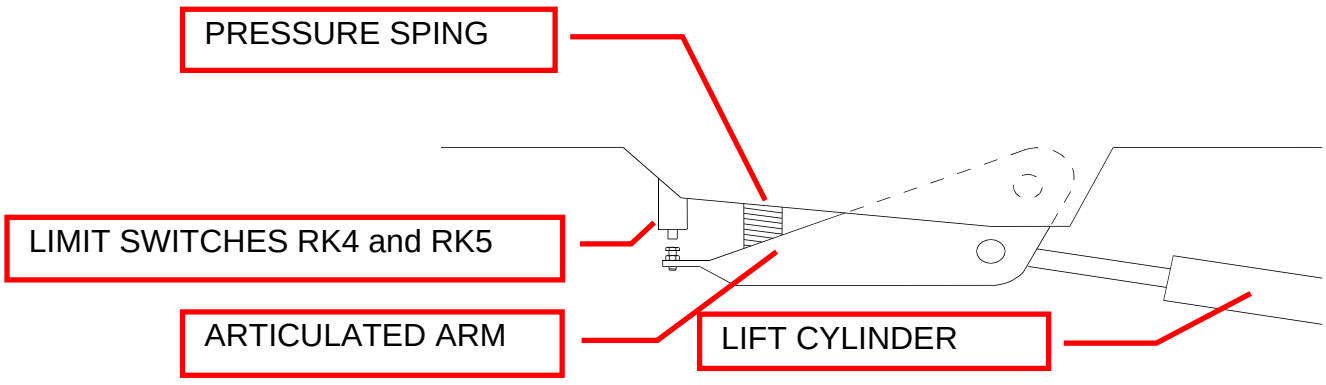
1. Support outriggers (Fig. A)
The safety limit switch RK3 prevents the operation of the outriggers and the driving device when the boom is not resting on the transport support. The switch is located on the tow-bar at the transport support.

2. Lifting the boom (Fig. B)
The lift's all support outriggers must be in the support position before the boom is lifted. Make sure that the wheels are off the ground.
The safety limit switches RK11, RK12, RK13 and RK14 are located on the support outriggers.

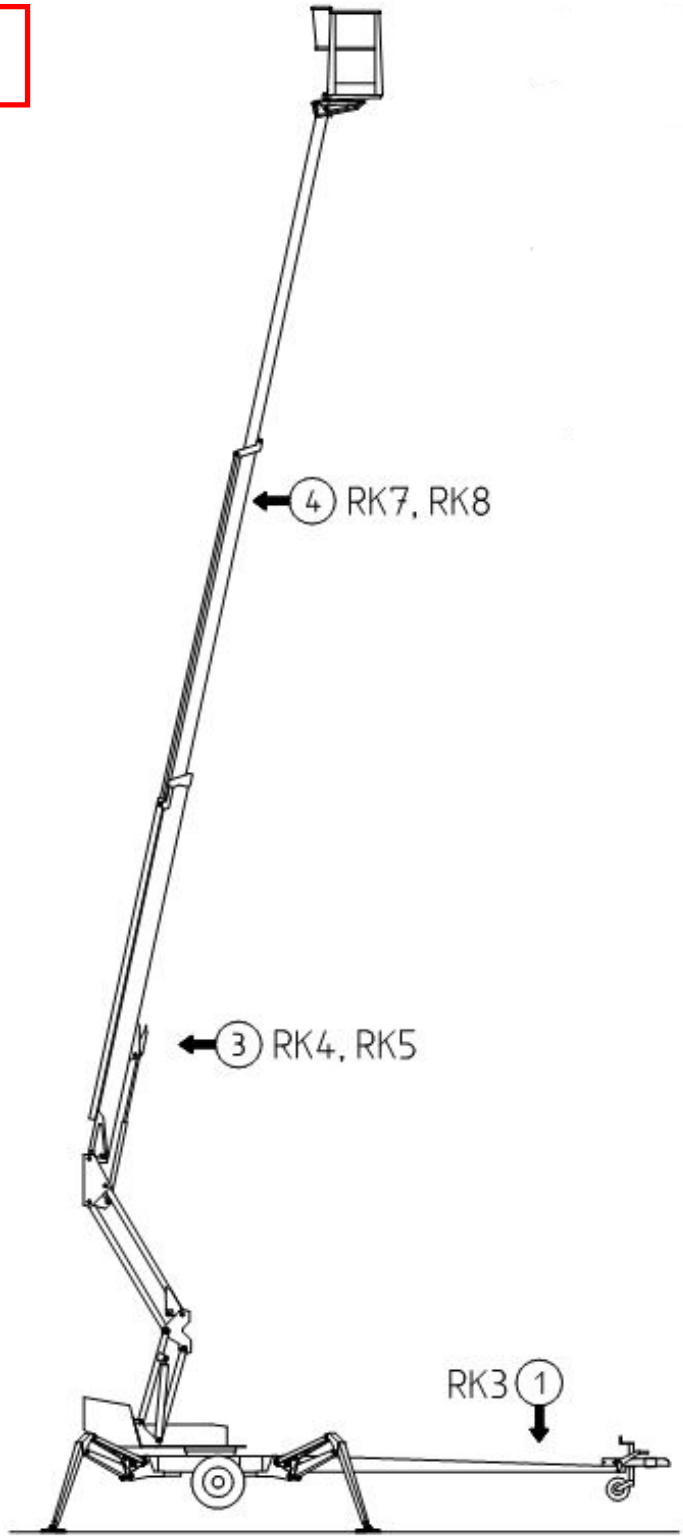
3. Overload protection switches (Figs. A and C)
The safety limit switches prevent overloading of the lift. At a predetermined position, the overload limit switch RK4 stops the extension of the telescope and the lowering of the boom.
The overload limit switch RK5 backs up, if the RK4, for some reason, does not work.
The green light in the control centre on the platform is lit, when the platform is within the allowed operating range. The red light will illuminate as soon as the RK4 stops the movement. When the red light is illuminated, the lift can be operated in the direction, where it stays inside the permitted outreach area. The safety limit switch RK5 backs up the operation of the RK4, and at the same time, switches on the buzzer on the platform.

4. Depressing the emergency stop button, stops all the movements immediately and turns off the power unit.
The emergency stop button must be pulled up before starting the power unit.

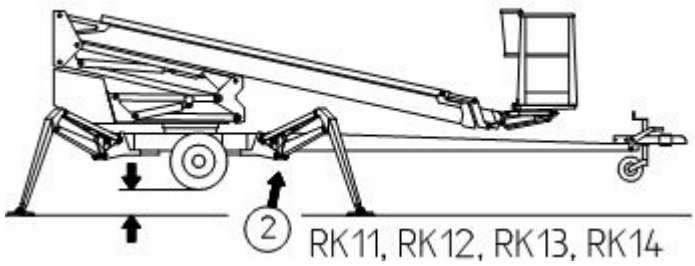
1. Ensure the operation of the safety devices – do not lock the cover of the chassis control centre with key while the lift is in operation.



A



B



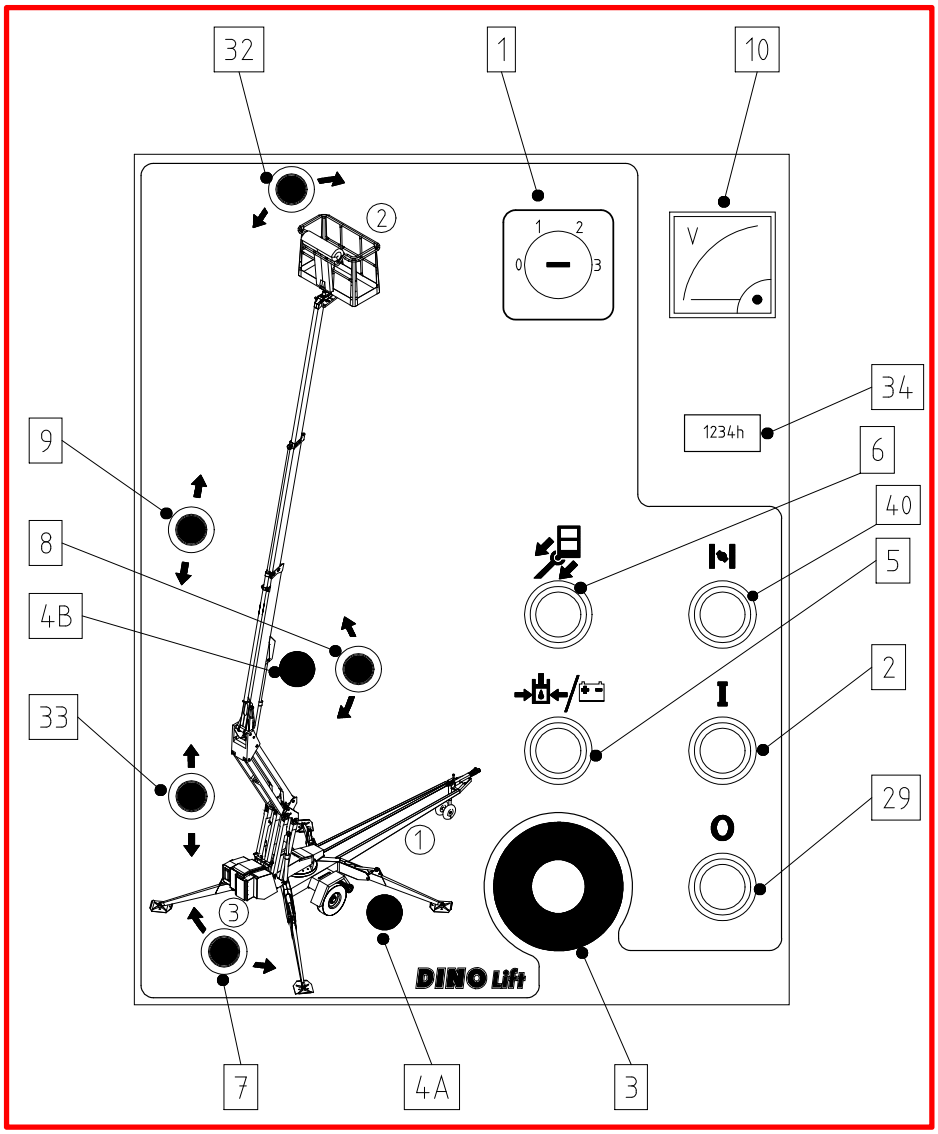
9 OPERATING CONTROLS IN THE CHASSIS CONTROL CENTRE

1. Selector switch
   0 - switched off
   1 - outrigger circuit and hydraulic drive
   2 - controlling the boom from the platform centre
   3 - controlling the boom from the chassis centre
2. Start button
3. Emergency stop button

4A. Green signal light for outrigger limit switches

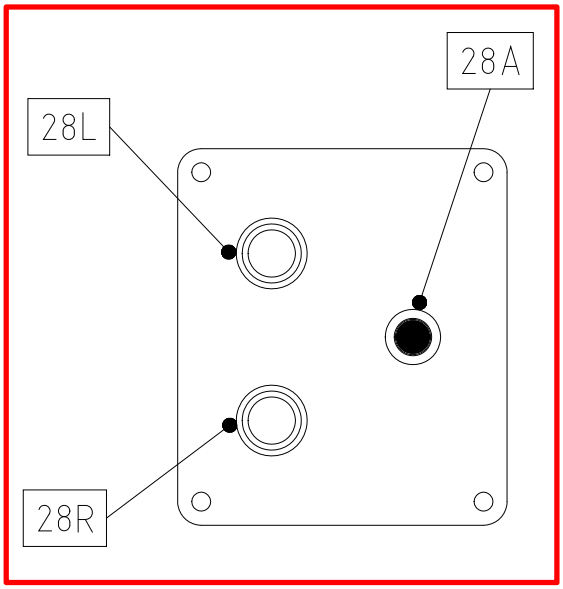
4B. Red signal light for safety device (RK5)

5. Start button for emergency descent system
6. Pushbutton for retracting the telescope
7. Lever switch for turning
8. Lever switch for boom system
9. Lever switch for telescope
10. Voltage meter
29. Stop button
32. Lever switch for levelling of platform
33. Lever switch for articulated arms
34. Hour meter
40. Choke



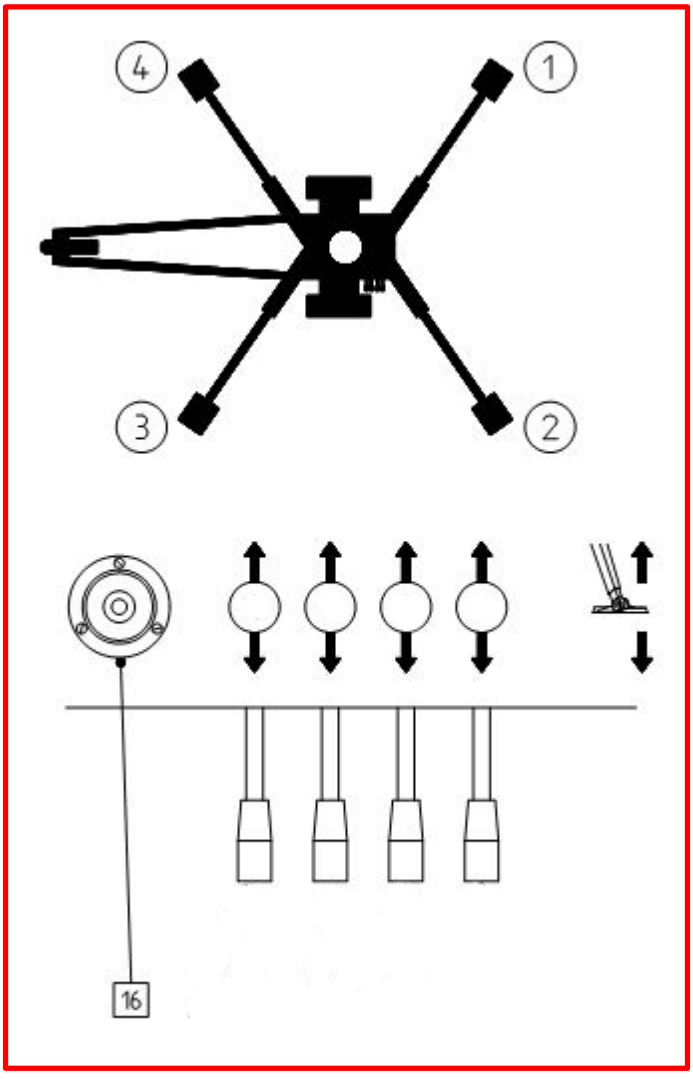
9.1 OPERATING CONTROLS OF DRIVE SYSTEM

28A. Forward - backward
28A + 28L drive to the left
28A + 28R drive to the right



9.2 OPERATING CONTROLS OF OUTRIGGERS

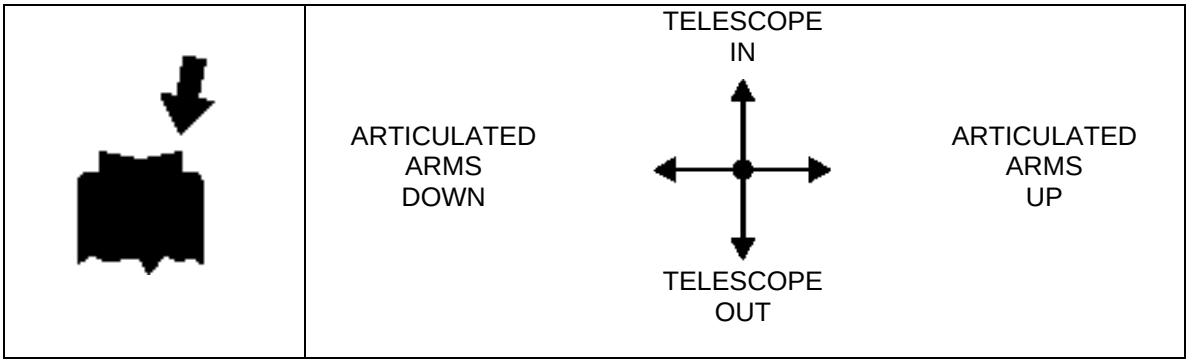
1. Rear outrigger, right
2. Rear outrigger, left
3. Front outrigger, left
4. Front outrigger, right
16. Position indicator of chassis

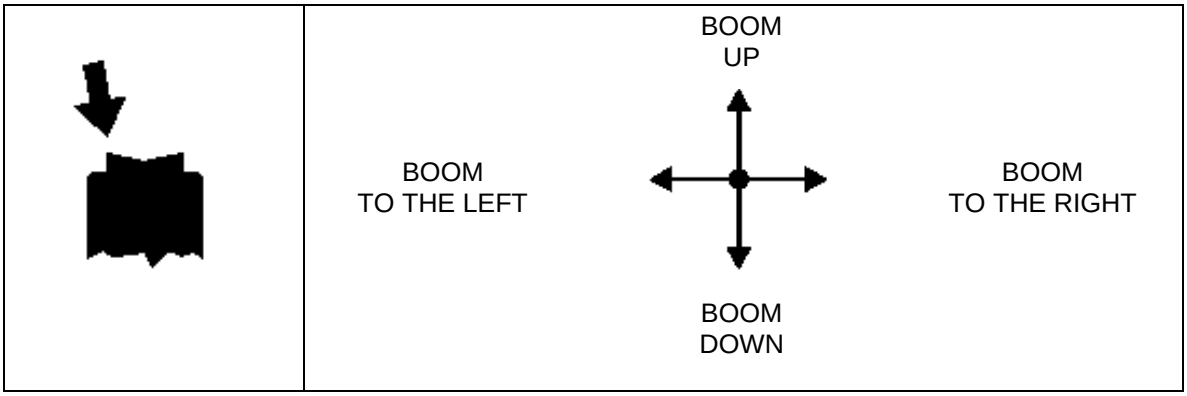


9.3 OPERATING CONTROLS IN PLATFORM CONTROL CENTRE

Close the cover of the chassis control centre before operating the controls on the platform.
The cover must not be locked while the lift is in operation.

17. Control lever. The functions to be controlled are selected using the "dead-man-buttons" at the end of the joystick. Always press the button first, and only after that, turn the handle. The safety connection prevents the movements, if the handle is turned before depressing the button.





A piece of extra equipment that requires two joysticks, operates like this:

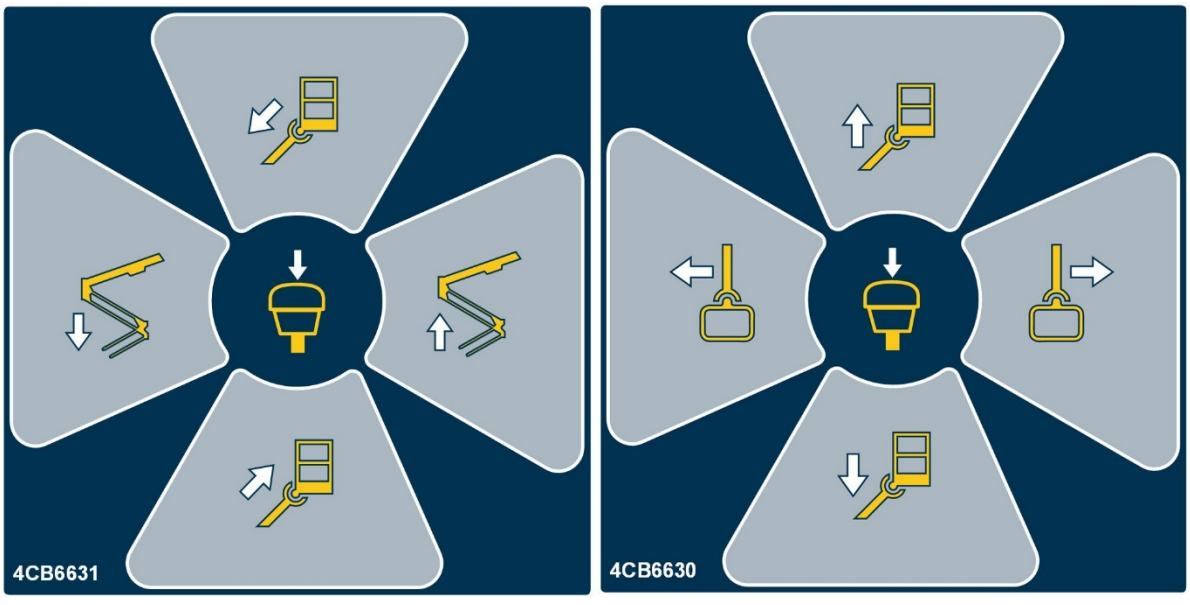


Fig. 2: Operating controls on the platform

18. Signal lights
    - green inside the allowed outreach range
    - red at the border of the allowed outreach range
20. Starting the emergency descent system
21. Retracting the telescope
22. Emergency stop
    - push to stop
    - pull to reset
23. Sound signal
24. Socket outlet 230VAC/ (2 pcs.)
25. Stopping the engine
26. Starting the engine
30. Turning the platform (used simultaneously with pushbutton 35)
31. Fuse for turning the platform
35. Levelling the platform (pushbutton)
36. Lever for levelling the platform (used simultaneously with pushbutton 35)
41. Choke

10 MEASURES TO BE TAKEN IN THE CASE OF EMERGENCY/IF THE LIFT IS AT RISK OF LOSING ITS STABILITY

Reduced stability can be caused by a fault in the lift, the wind or other lateral force, collapse of the standing base or negligence in providing sufficient support. In most cases one sign of reduced stability is the inclination of the lift.

WHEN AT RISK OF LOSING THE STABILITY

1. If there is time, try to find out the reason for the reduced stability and the direction of its effect. Warn other people on the worksite using the alarm signal.

2. If possible, reduce the load from the platform in a safe manner.

3. Reduce the outreach to the side by retracting the telescopic boom using the emergency descent system. Avoid abrupt movements.

4. Turn the boom away from the danger zone, i.e. to a position where the stability of the lift is normal.

5. Lower the boom.

If the stability has been lost as a result of a fault in the lift, repair such a fault immediately.

Do not use the lift until the fault has been repaired and the condition of the lift has been verified.

IN THE EVENT OF OVERLOADING

1. If there is time, try to find out the reason for the reduced stability and the direction of its effect. Warn other people on the worksite using the alarm signal.

2. If possible, reduce the load from the platform in a safe manner.

3. Reduce the outreach to the side by retracting the telescopic boom using the emergency descent system.

4. The green light will illuminate as soon as the overloading situation is reset. After this, the machine may be operated normally.

IN CASE THE POWER SUPPLY IS INTERRUPTED (diesel/mains)

1. Lower the boom using the emergency descent system (see point “Emergency descent system”).

2. In case of emergency, the outriggers can also be operated using the emergency descent system (Note! The movements are notably slower when operated by the emergency descent system)

3. Find out the reason why the energy supply was interrupted.

IN CASE OF MALFUNCTION, WHEN EVEN THE EMERGENCY DESCENT SYSTEM IS NOT OPERATIONAL

1. If the emergency descent system does not operate, try to warn other personnel present on the site or call for help so that the power supply required for normal operation can be resumed or the emergency descent system can be made operational by changing, for example, the battery so that the person on the platform can be brought down safely.

Always check the condition of the emergency descent system battery before putting the lift into operation (see point “Operating from the chassis control centre”).

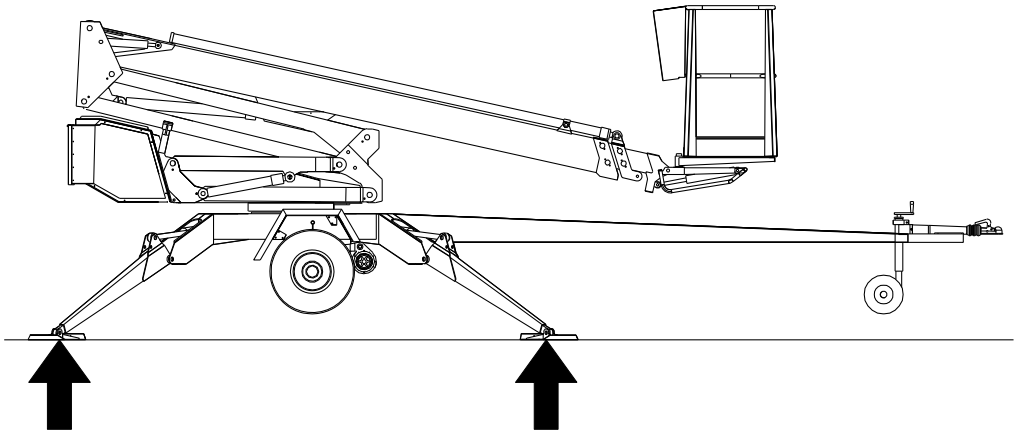
11 STARTING THE USE

2. Ground stability

- make sure that the ground is even and hard enough to support the lift in a steady level position

Soil material	Density	Max. ground pressure P kg/cm²
Gravel	High density	6
	Medium density	4
	Loose	2
Sand	High density	5
	Medium density	3
	Loose	1.5
Fine sand	High density	4
	Medium density	2
	Loose	1
Sand/ mud	High density (very hard to work)	1.00
	Medium density (hard to work)	0.50
	Loose (easily worked)	0.25

- if the ground is soft, use sufficiently large and sturdy additional plates under the support outriggers



- **observe the effect of ice, possible rain and inclination of the surface on the support (the support outriggers must not slip on the surface)**

- the operation is prohibited if the lift is not properly supported and in a level position

3. Drive or push the lift to the inspected lifting site

- engage the parking brake
- disconnect the lift from the towing vehicle

4. Connecting the power supply to the lift

A. POWERED BY AC-SUPPLY

While the mains voltage is plugged in, the operating voltage of 12 VDC is supplied by a power source.

- connect the mains cable to the power supply
- turn on the main switch (Fig. A)
- with the electric motor at maximum load, the voltage must be 230 VAC (-10%/ +6%), the frequency 50 Hz, and rating of the fuse 10A (the length of the connecting cable has some effect)

B. POWERED BY COMBUSTION ENGINE

In the absence of the mains current, the operating voltage of 12 VDC is supplied by a battery.

- do not connect the mains cable (230 VAC)
- turn on the main switch (Fig. A)
- open the fuel cock
- switch on the choke for the start by depressing the button on the cover of the centre

  If the battery is flat, start the power unit by pulling the starter grip, and at the same time, keeping the button at the power unit's bed depressed.
  Pull the starter grip lightly until you feel resistance, then pull briskly.
  Do not allow the starter grip to snap back against the engine.
- adjust the engine speed to halfway.

Leave the combustion engine running between the operations, because the battery will not be recharged, unless the combustion engine is running.
Close the fuel cock when stopping the combustion engine.

The fuel cock must be closed during towing of the lift.

C. POWERED BY DIESEL ENGINE

- do not connect the mains cable (230 VAC)
- turn on the main switch (Fig. A)

  Refer to the separate user manual for the diesel engine, delivered with the lift, for instructions about starting up the engine, when the battery is flat.

Leave the combustion engine running between the operations, because the battery will not be recharged, unless the combustion engine is running.
To avoid damaging the electronics of the diesel engine, do not disconnect the mains current while the diesel engine is running!

5. To access the operating controls, open the cover on the chassis

Check the condition of the battery to ensure the operation of the emergency descent system.
The charge level of the battery is indicated by LEDs.
During charging, the red LED is on and the green LED is off.

- when the battery is almost fully charged, both LEDs are lit
- when the battery is fully charged, the green LED is lit and the red one is flashing
- if both LEDs are lit after the charging, the battery is dead

6. Turn the selector switch (1) to position 1 (Fig. B)

7. Start the engine by depressing the button 2 (green)

The electric timer of the lift automatically disconnects the supply voltage (12 VDC) in about 1 hour after the electric motor or the combustion engine has been turned off. Re-activate the power supply by pressing the start button either in the chassis control centre or in the platform control centre.

Petrol engine:

- turn off the choke
- adjust the engine speed

8. Lower the front support outriggers (on the tow-bar side)

9. Lower the rear support outriggers (do not damage the tow-bar jockey wheel)

10. Level the chassis with the outriggers with the help of the level gauge (16). The air bubble must be located inside the inner ring.

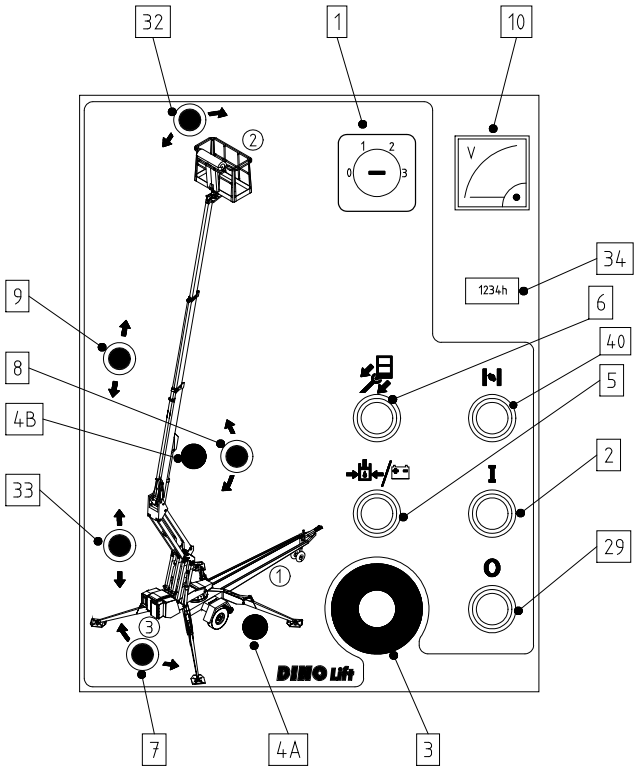
Make sure that the wheels are clearly off the ground. 

- the (green) signal light 4A in the main control centre is illuminated, when all the outriggers are in the support position and the limit switch circuit of the outriggers is closed
- make sure all outriggers are firmly supported on the ground

11.1 OPERATING THE LIFT FROM THE CHASSIS CONTROL CENTRE

11. turn the selector switch (1) to position 3

- now you can operate the boom with the levers 7, 8, 9, 33 and the platform with the lever 32 from the chassis control centre



Test the operation of the emergency descent system as follows:

1. lift the boom about 1-2 metres (using lever 8) and extend the telescope 1-2 metres (using lever 9) keeping the emergency stop button depressed – the movement shall now stop

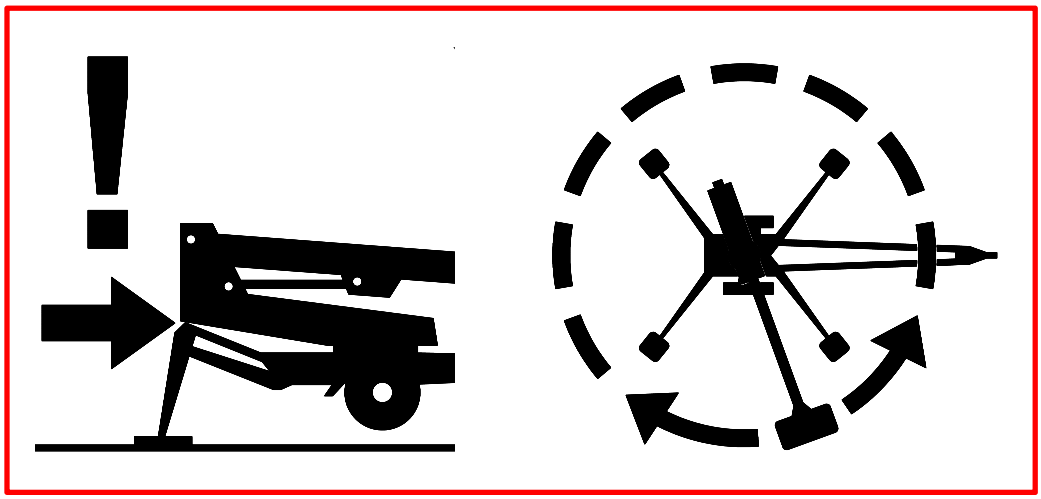
2. start the power unit of the emergency descent system (pushbutton 5), retract the telescope (lever 9) and lower the boom (lever 8)

3. pull up the emergency stop button

4. lift the platform from the tow-bar and turn it to the side so that you can lower it

5. extend the telescope as much as is necessary to ensure that stepping onto the platform is safe

6. **If you have levelled the chassis of the lift ON A GRADIENT, turn the boom around carefully in the lower position to make sure that the boom does not bang against the support outriggers.**



7. turn the boom to the side so, that you can lower it

8. extend the telescope as much as is necessary to ensure that stepping onto the platform is safe

Do not damage the tow-bar jockey wheel

The boom movements are noticeably slower when the emergency descent system is used.
The speed of the boom movements cannot be adjusted continually with the control levers when the lift is operated from the chassis control centre.

Lock the selector switch (1) in position 1 (support outriggers) before working under the boom.
Make sure that neither people nor load are on the platform.

11.2 OPERATING THE LIFT FROM THE PLATFORM CONTROL CENTRE

12. Turn the selector switch (1) to position 2 and take away the key
Do not lock the protective cover of the chassis control centre with the key.

- now you can operate the boom with the lever 17 in the platform control centre

Press first the rocker switch at the end of the control lever, and after that,move the lever carefully in the desired direction of movement. If you move the lever before pressing the rocker switch, the action is deterred.

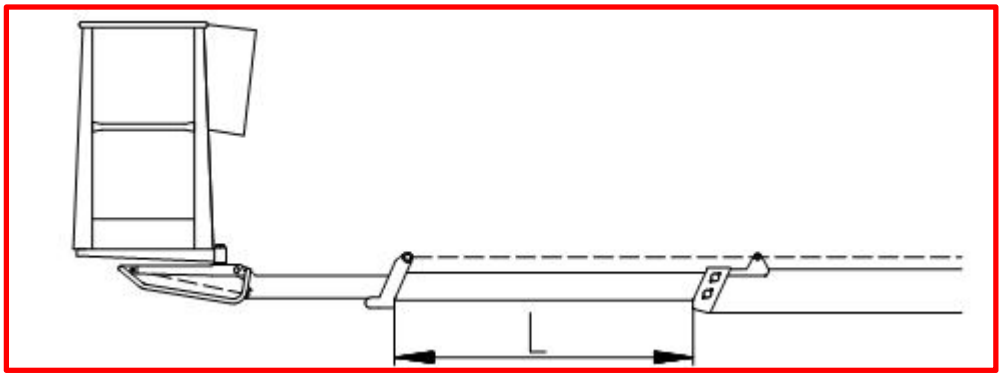
- test the operation of the emergency descent system as follows:
  - start by lifting the boom about 1-2 metres (with lever 17) and continue by extending the telescope 1-2 metres keeping the emergency stop button depressed – now the movement shall stop
  - start the power unit for the emergency descent (pushbutton 20), retract the telescope and lower the boom (lever 17)
  - pull up the emergency stop button

Do not damage the tow-bar jockey wheel

The movement speed of the platform can be continually adjusted with the lever (17).

13. Test the operation of the overload limit switch RK4

- put a load on the platform as shown in the picture below



- drive the boom to a horizontal position
- extend the telescope
  When the movement stops, the red overload light (18) shall be illuminated.
- compare the outreach with the outreach diagram in this manual

12A. Measures to be taken after an event of overloading

- **(The overload limit switch RK5 switches off the electricity supply to the operating controls, and switches on the buzzer on the platform)**
- **retract the platform to inside the operating range of the RK4 by pressing the "telescope in" button (31 or 36)(the green light will be illuminated)**
- **after this, the lift may be operated normally**

WARNING!
Do not add load (e.g. another person) onto the platform, while the red overload light (18) is illuminated.

Example: A person, who is working alone on the platform, extends the telescope, or an empty platform is driven from the chassis control centre to the maximum reach, keeping it close to the ground. If the overload signal light will light up after this, it is not allowed to take any additional load onto the platform before the telescope has been retracted.

IF THE SAFETY DEVICES OR THE EMERGENCY DESCENT SYSTEM ARE NOT WORKING, HAVE THEM REPAIRED BEFORE OPERATING THE LIFT.

14. Refer to the item "Daily inspections" in the task list for servicing.

15. With the boom slightly lifted and the telescope extended, make sure that the platform does not lower by itself while the operating controls are not being used.

16. When working under cold weather conditions, let the engine run for a while without load to increase the hydraulic oil temperature. Start the operations by driving the movements carefully without load back and forth from the chassis control centre.

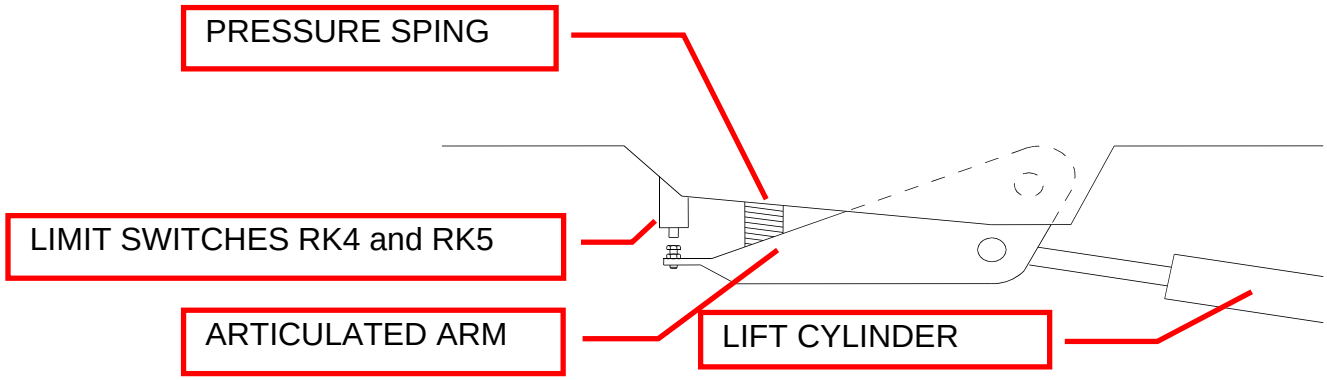
17. Move the platform to the work object

The platform movements can be operated with continually adjustable speed from the platform control centre (not from the chassis control centre). Only one movement can be operated at a time. If several control levers are operated simultaneously, only the movement with the least resistance will operate.

Lowering the platform to transport position: Always retract the telescope completely and turn the platform perpendicular to the boom before lowering the boom onto the transport support.

Do not damage the tow-bar jockey wheel
Do not take additional load in the upper position

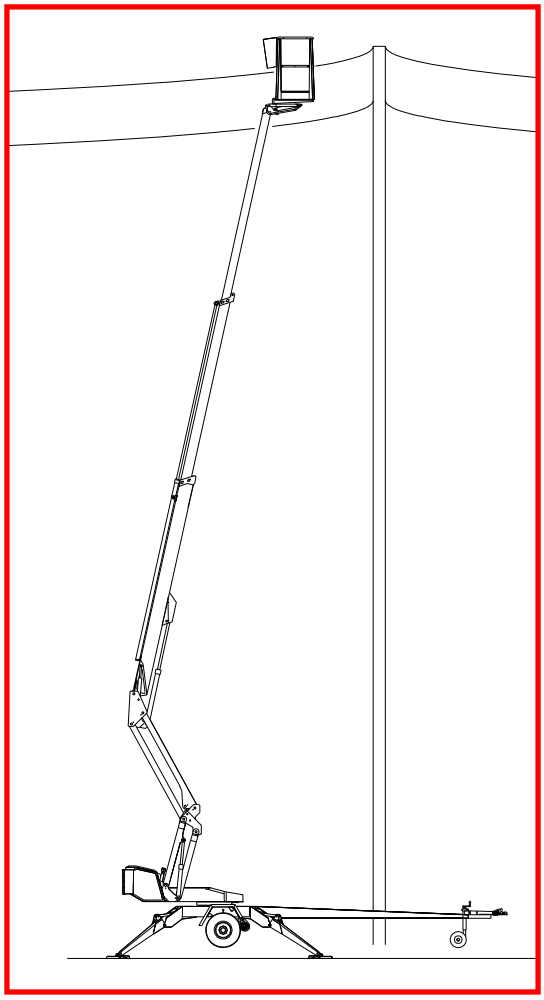
18. Observe when lifting the platform



- the operating range of the platform depends on the load (see “Technical Data”) and is monitored by the safety limit switches RK4 and RK5, which are located under the protecting cover
  The limit switches must not be adjusted or modified. The inspection and adjustment may only be carried out by an authorized serviceman.

19. Working a long time in the same position

- there are pushbuttons for both stopping and starting in both the platform and the chassis control centres
  When the weather is warm, and the platform is kept for a longer period in the same position, it is not necessary to let the engine run continuously.
- when the weather is cold, it is, however, recommended to let the engine run to keep the hydraulic oil warm
- It is recommended to also leave the combustion engine running between the operations, to ensure the battery remains well charged
- check the stability and condition of the base regularly during the operation, taking into account the weather and ground conditions
- the electric timer of the lift automatically disconnects the supply voltage (12 VDC) in about 1 hour after the electric motor or the combustion engine has been turned off.
  Re-activate the power supply by pressing the start button either in the chassis control centre or in the platform control centre.



20. When moving the platform, remember the following

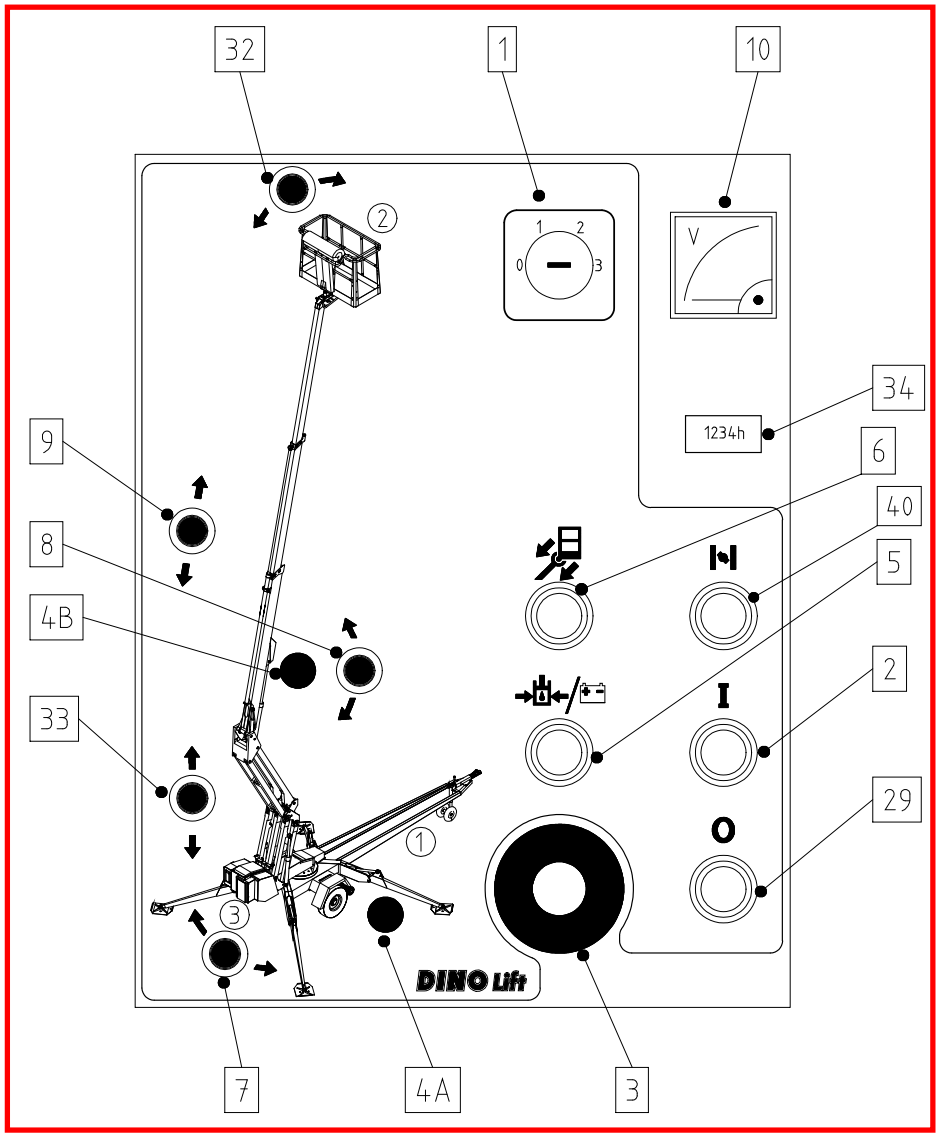
- beware of high voltage power lines
- do not exceed the max. allowed lateral force (400N)
- do not touch open electric wires
- do not throw objects from the platform
- do not damage the lift
- do not take additional load in the upper position
- do not damage other devices
- do not load the platform vertically more than what is allowed

21. When leaving the lift

- drive the lift to a safe position, preferably to the transport position
- switch off the power unit
- prevent unauthorized use of the lift by locking the control centre cover

22. Adjusting the position of the platform

From the chassis control centre (LCB)



The position of the platform may be adjusted from the chassis control centre in the following way:

- turn the selector switch (1) to position 3
- select the direction for the correction movement using the control lever (32)

From the platform (UCB):

The position of the platform may be adjusted from the platform control centre in the following way:

- turn the selector switch (1) to position 2
- press the selector button (35) for levelling of the platform
- select the direction for the correction movement using the control lever (36)

12 EMERGENCY DESCENT SYSTEM

As a precaution against possible power failure, the lift is equipped with a battery operated emergency descent system.

1. The system comprises
   - 12 V, 44 Ah
   - recharger
   - hydraulic unit 12 VDC

2. Servicing the battery
   - the system incorporates an automatic battery recharger with short circuit and overheat protection

     - output 125 W
     - charging voltage 13.7–14.7 V
     - rated current 10 A

3. The hydraulic unit comprises:
   - pressure relief valve, set value 16 MPa (160 bar)
   - check valve
   - direct current motor of 800 W

Start the emergency descent system by depressing the pushbutton (20 on the platform and 5 on the chassis).
The emergency descent system is operational only when the pushbutton is being depressed.

Using the emergency descent, retract first the telescope completely, then lower the boom, and finally, turn the boom.

The emergency descent system can also be used for raising the support outriggers to the transport position

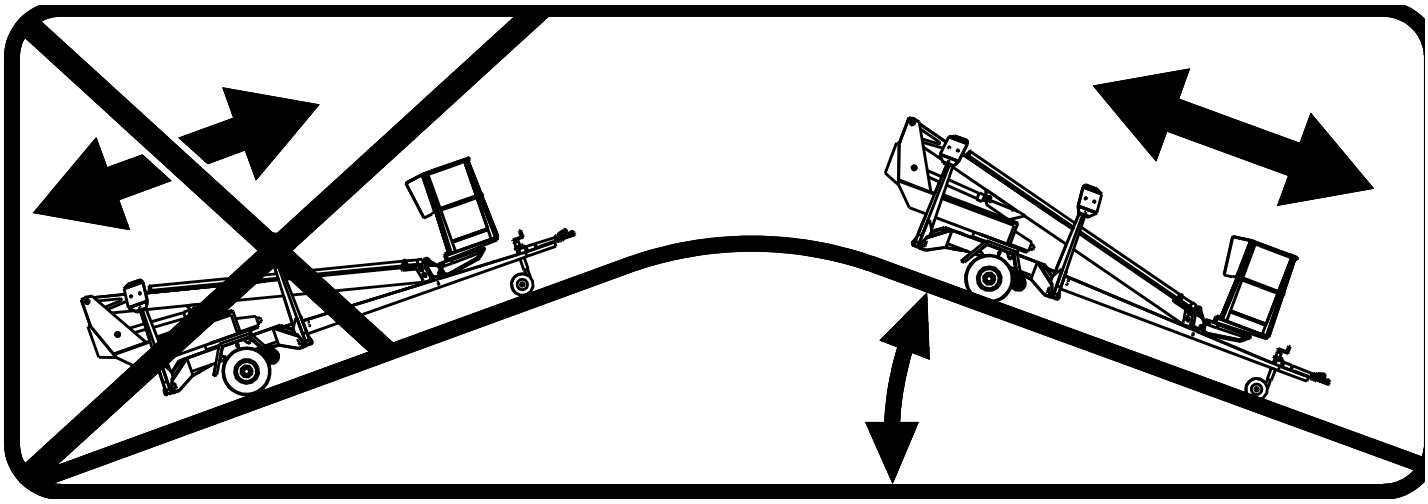
If the emergency descent system does not operate, try to attract the attention of other personnel present on the site, so that they can restore the power supply to the lift, or make its emergency system operational by, for example, changing the battery.

Always check the condition of the battery for the emergency descent system before putting the lift into operation.
(See point “Operation of the safety devices”)

13 DRIVING DEVICE

The hydraulic driving device is intended for moving the lift within the work area if the towing vehicle cannot be used.

1. **Do not drive downhill with the driving device, if the inclination of the surface is more than 5 per cent, i.e., more than 1/20 (corresponding to a descent of 0.5 m over a distance of 10 m). If the gradient of the surface is greater than this, you may lose control of the device.**



2. When driving on a slope, the tow-bar must always point towards the descent. Never drive with the driving device with the tow-bar pointing towards the ascent.

3. Always place chocks under the wheels before disconnecting the device from the towing vehicle.

4. Always apply the handbrake before disconnecting the lift from the towing vehicle. Only use the handbrake as a parking brake or for emergency stopping.

5. Never leave the lift on a slope being supported only by the self-braking action of the driving device.

6. When transferring the lift using the driving device:
   - **take care not to allow the wheel to roll over your foot**
   - **look out for sudden sideways movements of the tow-bar**
   - **be careful not to cause danger to other people and the environment**

7. Do not move the device on a slope using only hand-power. You may lose control over it and cause an injury.

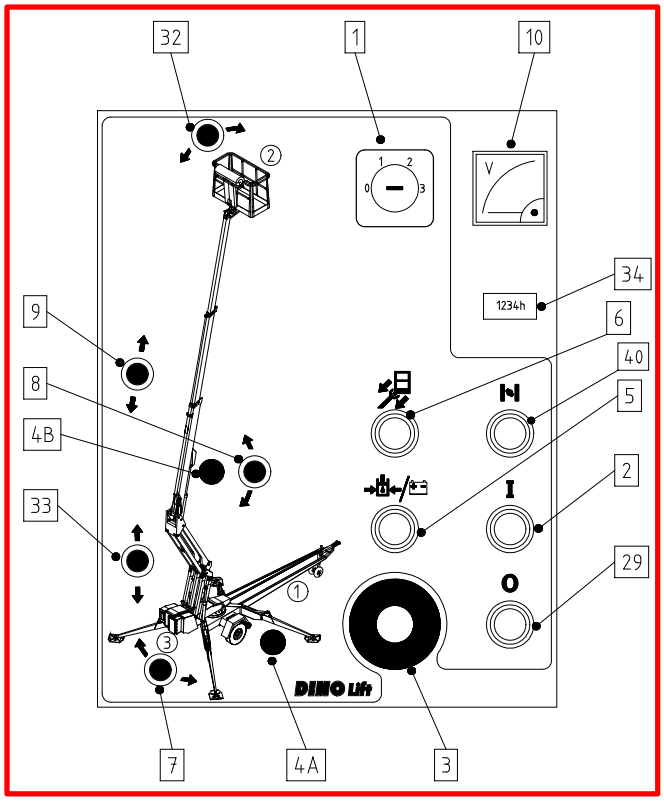
8. Never park a vehicle combination on a slope.

14 DRIVING DEVICE

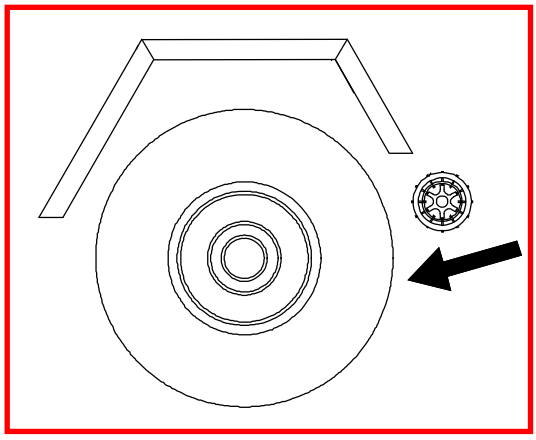
The hydraulic driving device is intended for moving the lift within the work area if the towing vehicle cannot be used.

- start the power unit, and adjust its running speed to ¾ of the maximum (combustion engine)
  The running speed of the power unit affects the driving speed.

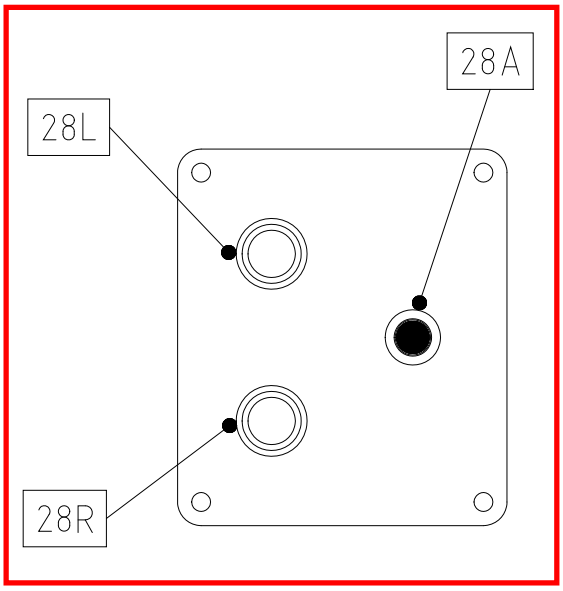
- turn the selector switch to the position (1) – outriggers



- Make sure that the platform is in the transport position and the outriggers are lifted in the upper position
- make sure that the mains cable is long enough to cover the whole travel distance (power supply from mains)
- switch the driving device to the drive position



- release the parking brake



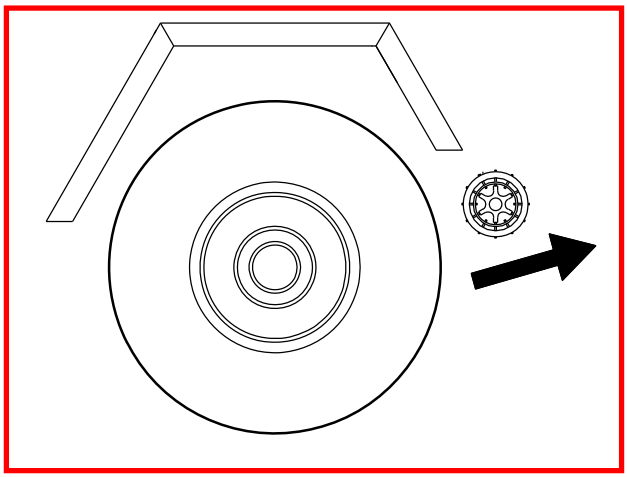
- drive the unit using the pushbuttons

forward/backward	28A
to the left	28A + 28L
to the right	28A + 28R

- do not drive the jockey wheel into obstacles or potholes

If one of the wheels bumps into an obstacle, the lift may turn abruptly.

- after the driving, apply the parking brake
- switch off the driving device
- disconnect the driving device from the wheel



Remote control for the driving device (optional extra).

- plug in the remote control cable to the socket in the control box of the driving device

Be careful not to damage the jockey wheel tube by extending it too much.

When moving the lift using the driving device, a suitable length for the jockey wheel's stem can be achieved by adjusting the gap between the lower surface of the tow-bar/brake rod and the wheel to 1-3 cm. Then the wheel may turn freely.

15 SPECIAL INSTRUCTIONS FOR WINTER USE

- **the lowest allowed operating temperature of the lift is -20 °C.**
- if the temperature is below zero, let the power unit run for a few minutes before starting the movements
- start with a few movements to warm-up oil in the cylinders and to ensure proper operation of the valves
- check that the limit switches and the emergency descent devices are operational and clean (from dirt, snow, ice, etc.)
- protect the control centre and the platform from snow and ice whenever they are not in use

Always keep the lift free from dirt, snow etc.

16 MEASURES TO BE TAKEN AT THE END OF THE WORKING DAY

1. Retract the telescopic boom fully.

2. Check that the platform is perpendicular to the boom.

3. Lower the boom/platform onto the support on the tow-bar.
   - the limit switch on the transport support prevents the operation of the support outriggers if the platform is not down

4. Close the cover of the platform control centre.

5. Turn the selector switch to position 0, and turn off the main switch.

6. If you want to recharge the battery, leave the mains cable connected; otherwise disconnect the lift from the mains supply.

7. Make sure that the covers are locked.

17 PREPARING THE LIFT FOR TRANSPORT

1. Retract the telescopic boom fully.

2. Check that the platform is perpendicular to the boom.

3. Lower the boom/platform onto the support on the tow-bar.
   - the limit switch on the transport support prevents operation of the support outriggers if the platform is not down

4. Close the control centre cover on the work platform.

5. Turn the selector switch (1) to position ”outriggers”.

6. Lift the support outriggers.
   - at first the rear support outriggers (do not damage the rear lights)
   - then the front support outriggers (do not damage the jockey wheel)

7. Apply the parking brake.

8. Make sure that the driving device is disconnected.

9. Turn the selector switch to position 0 and disconnect the lift from the power supply.

10. Make sure that the covers are locked.

18 CONNECTING TO THE TOWING VEHICLE

1. Lift up and push forward (in the driving direction) the handle of the ball-coupling. Now the ball-coupling is released.

2. Press the ball-coupling onto the towball using only a little force. The connection and locking take place automatically.

Always make sure, after the connection, that the ball-coupling is properly locked

Clean and lubricate the ball-coupling regularly.

3. Connect the emergency stop wires and light plug to the vehicle. Check the cable for chafing and proper operation of the wires.

4. Check the operation of the lights.

5. Carefully release the parking brake and make sure that its locking is in order and that its handle stays in the lower position.

6. Lift up the jockey wheel to the transport position.

No load allowed on the platform during towing of the lift.

In particular, if you are parking or disconnecting the lift from the towing vehicle on a slope, apply the parking brake as firmly as possible. After having applied the parking brake, push the lift backward to make the reverse automatics release the brake shoes. The spring cylinder pulls the parking brake tighter, and the brakes of the vehicle will again be properly engaged.
Adjust the brakes according to the service instructions.
Place chocks under the wheels as an additional precaution.

If you leave the lift standing for a longer period of time, for example over the winter, we recommend propping it up to release any load from the wheels.

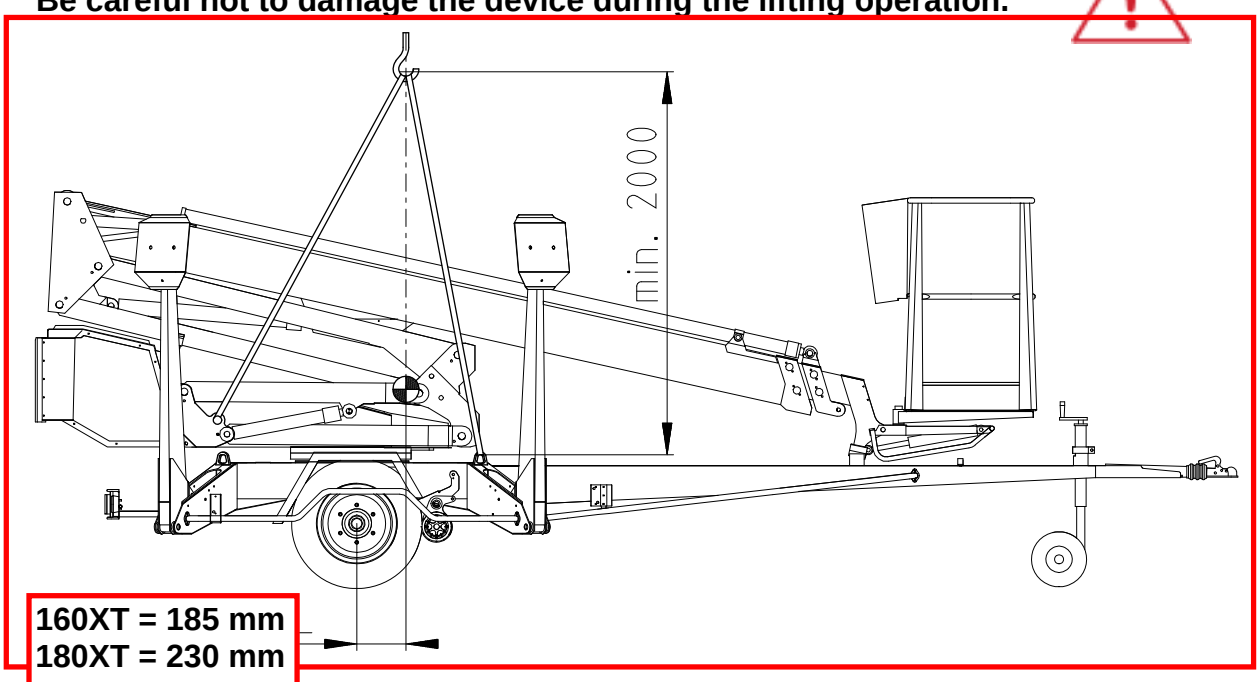
- **Always ensure before towing:**
  - **transport position of the outriggers**
  - **locking of the ball-coupling**
  - **operation of the lights**
  - **parking brake**
  - **condition and pressure of the tyres**
    - **rear axle450 kPa (4.5 bar)**
    - **jockey wheel250 kPa (2.5 bar)**
  - **safety wires**
  - **locking of the brakes after the transportation**
  - **attachment of the jockey wheel**
  - **that the driving device is disconnected from the wheel**

19 INSTRUCTIONS FOR SERVICE AND MAINTENANCE

19.1 GENERAL SERVICE INSTRUCTIONS

- carry out the servicing and inspection of the lift in accordance with the instructions
- in case of more demanding repair works, turn to a specialist or contact the distributor or the manufacturer of the lift
- do not modify the lift without written consent from the manufacturer
- any such faults which may affect the operational safety of the unit must be repaired before the lift is next used
- do not let oil spill on the ground
- keep the lift clean, especially the platform
- clean up the lift before service and inspection
- use genuine spare parts
- support the platform, boom system, articulated arms and support outriggers in a position in which the load does not rest on the structure under repair or cause any other danger (e.g. transport position or use of supporting structures)
- the device may be lifted with two slings, each with a load-carrying capacity of at least 2,500 kg, by slinging it at the four lugs (see picture)

Be careful not to damage the device during the lifting operation.



160XT = 185 mm
180XT = 230 mm
210XT = 250 mm

19.2 SERVICE AND INSPECTION INSTRUCTIONS

1. The first service after 20 hours of operation

- change the pressure filter element
- adjust the brakes according to the instructions (see point “Wheel brakes and bearings”)
- check the wheel bolts for tightness (160XT = 90 Nm/180XT and 210XT = 325 Nm) after about 100 km of driving

2. Daily service

- check the oil level in the hydraulics, top up if necessary
- check the hydraulic connections
- check the structures visually
- check the operation of the emergency descent and emergency stop functions
- check the operation of the safety devices

3. Weekly service

- check the tyre pressure (450 kPa, jockey wheel 250 kPa)
- lubricate the joint pins (see point “Lubrication plan”)
- check the sliding surfaces of the telescope and lubricate them with silicon, if necessary
- check the clearance between the slide pads and surfaces and adjust the pads if necessary
- put a load (160XT = 270 kg/180XT = 120 kg/210XT = 80 kg) onto the platform and drive the boom to a horizontal position

After this, extend the telescope until the red signal light lights up and the movement stops. Measure the stroke in accordance with the instructions, and compare it with the setting of the RK4 (see point “Adjusting the overload limit switches”). If the stroke is longer, contact the service technician.

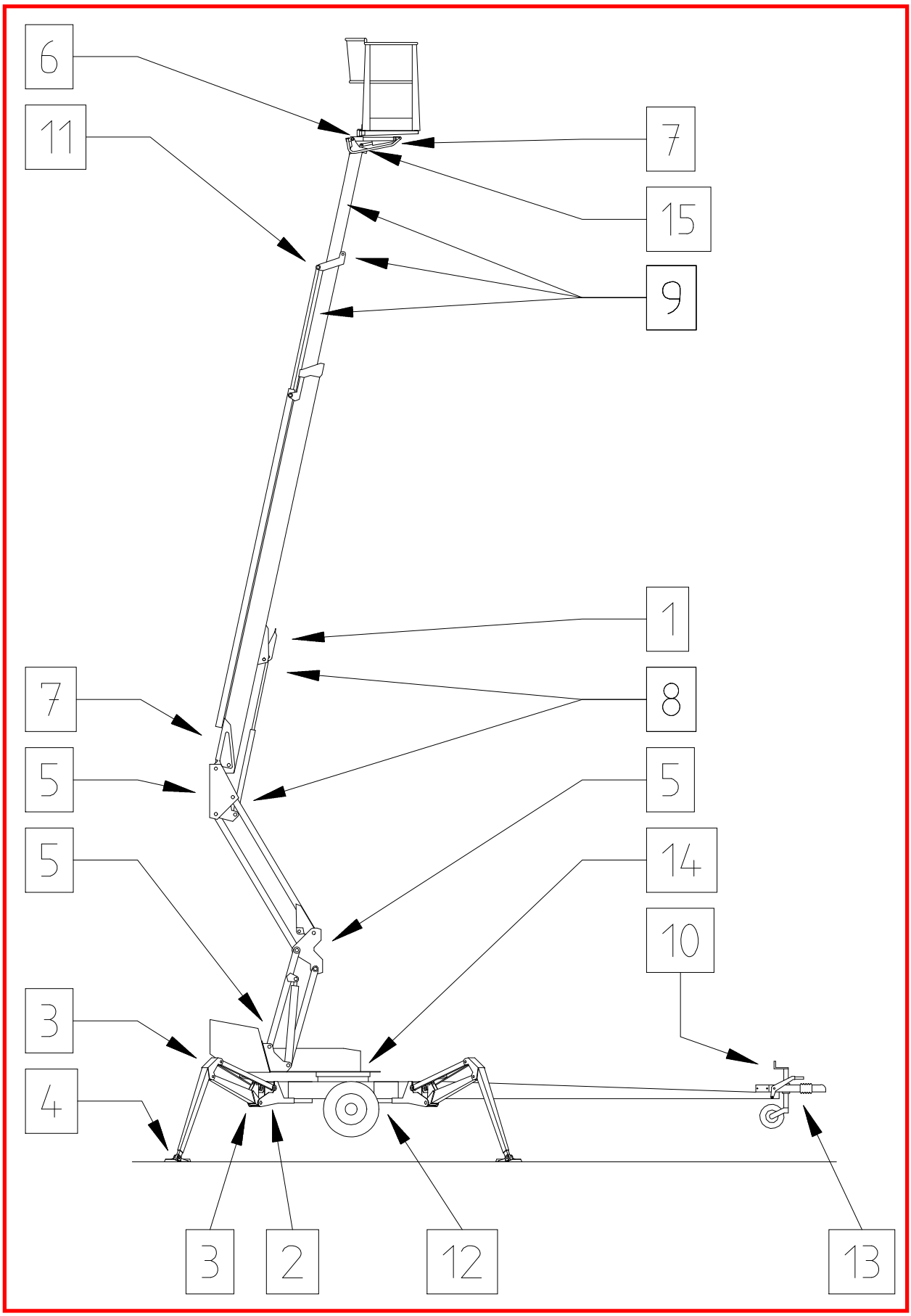
4. Service every six months

- change the hydraulic oil and the filter cartridge.
- check the condition of the brakes
- check the the wheel bolts for tightness (160XT = 90 Nm/180XT and 210XT = 325 Nm)
- grease the gear ring of the turning device

5. Periodic service every 12 months in accordance with the instructions for regular servicing below in this manual

If the lift is operated under demanding conditions (in exceptionally humid or dusty environment, corrosive climate, etc.) the intervals between the oil changes and the other inspections shall be shortened to meet the prevailing conditions in order to maintain the operational safety and reliability of the lift.
The performance of the periodic servicing and the inspections is absolutely mandatory, because their negligence may impair the operational safety of the lift.
The guarantee will not remain valid, if the servicing and the periodic inspections are not performed.

19.3 LUBRICATION PLAN



EVERY 50 HOURS

1. Bearings of the overload protection device (safety device)
2. Bearings of the outrigger cylinders
3. Bearings of the outriggers
4. Bearings of the outriggers' foot plates
5. Bearings of the boom and the articulated arms
6. Bearings of the platform
7. Bearings of the levelling cylinders (except the bearing on the rod side of the upper levelling cylinder)
8. Bearings of the lifting cylinder
9. Sliding surfaces/rolls of the telescope
10. Jockey wheel slide and threads

TWICE A YEAR

11. Bearing of the telescope cylinder
12. Driving device
13. Overrun brake - overrun
14. Turning device bearings* and gear ring
15. Bearing on the rod side of the upper levelling cylinder

Lubricant Esso Beacon EP2 or equivalent

The overload protection device joint (point 1) must absolutely be lubricated regularly and always immediately after the lift has been washed..

Moving parts of the of the outrigger limit switch mechanism must be lubricated every 50 hours.

If necessary, apply a thin grease film on the moving parts of the ball-coupling.

Always lubricate the lift and apply a protective grease film immediately after the washing.

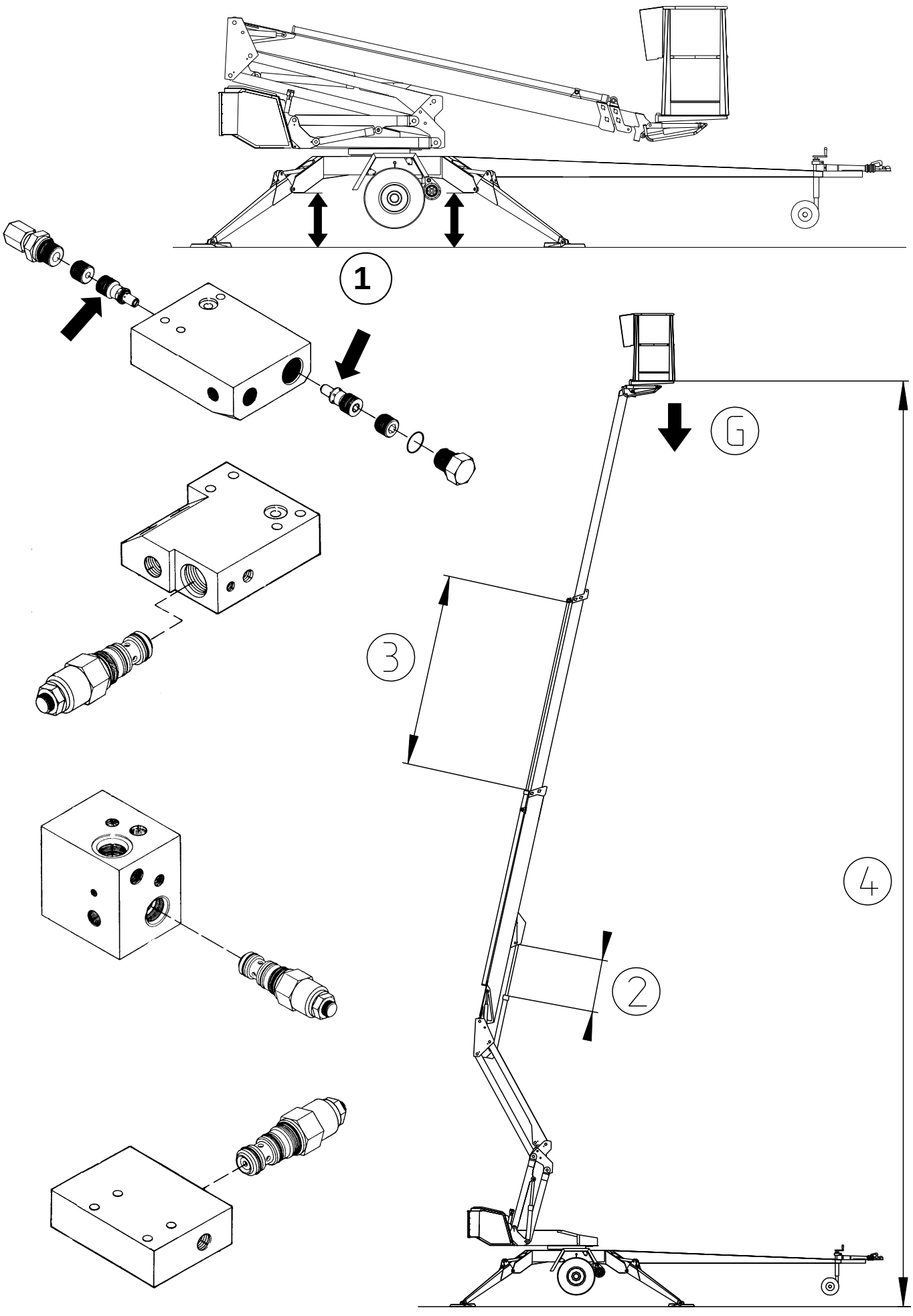
*Remove the crescent-shaped covers from the underside of the lift, and lubricate the turning bearing nipples (4 pieces).

Lubricate the visible parts of the Flyer-chains of the boom twice a year. Use Master chain lubricant 1-4014 or equivalent.

19.4 LONG-TERM STORAGE

Clean the machine carefully, lubricate it and apply protective grease to it before putting it into storage for a longer period of time (see point “Lubrication plan”). Repeat the cleaning and lubrication procedures when you resume the operation.

The periodic inspections must be executed following the steps described in the instructions.


1
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3
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2

19.5 LOAD HOLDING AND LOAD REGULATION VALVES

Checking the operation

1. To check the load holding valves of the outrigger cylinders for tightness, measure the height of the chassis from the floor separately at each outrigger, and observe the height in a few minute's time.

2. To check the load regulation valves of the boom cylinder and the cylinders of the articulated arms for tightness, drive the boom to a position in which its position can be reliably measured. Observe the possible movement of the boom in a few minute's time.

3. To check the load regulation valve of the telescope cylinder for tightness, extend the telescope and stop the movement at any position, measure the stroke and observe in a few minutes time that the stroke does not change. (Note! Drive the boom to an almost vertical position).

4. To check the load regulation valve of the platform's levelling system for tightness, put a load of 100-200 kg on the platform and measure the distance from the rear edge of the platform to the floor. Observe in a few minutes time that the height position does not change.

Service instructions

1. Remove and clean the valve.

2. Check the O-rings and, if necessary, replace them.

3. Put the valves carefully in place.

4. If necessary, replace the valve.

5. Do not change the set values of the valves.

Support the platform, the boom system and the outriggers in a position, where the load does not rest on the structure to be repaired. Ensure that there is no residual pressure left in the cylinders.

19.6 WHEEL BRAKES AND BEARINGS

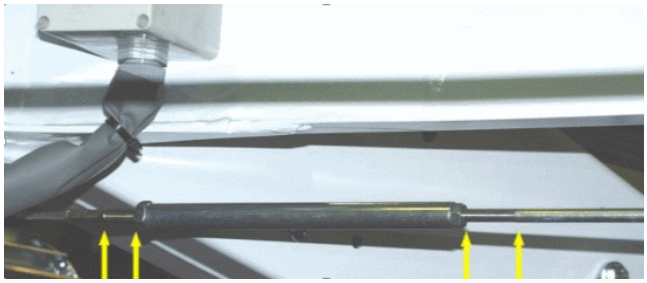
Adjusting the brakes

Support the lift by raising its wheels off the ground.

Make sure that the wheels can rotate freely.

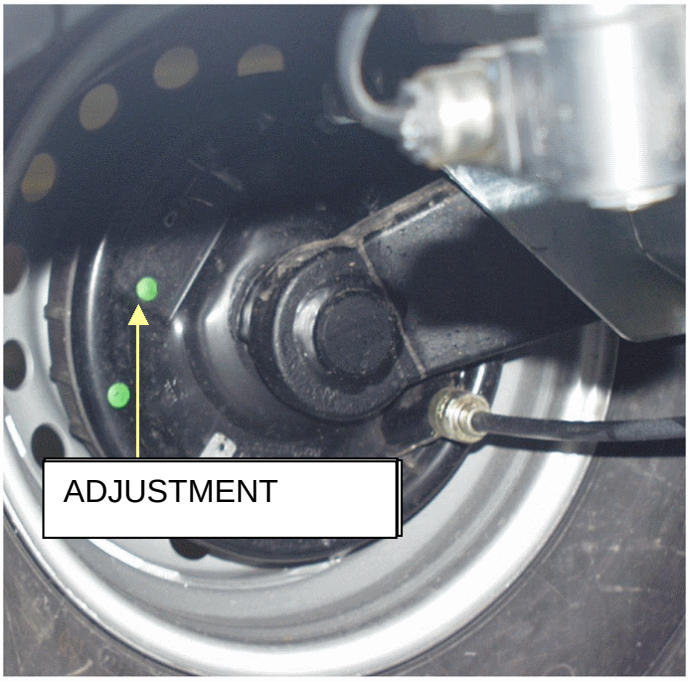
The brake rods must be slack (with the handbrake released).

Check the attachment of the brake rods.

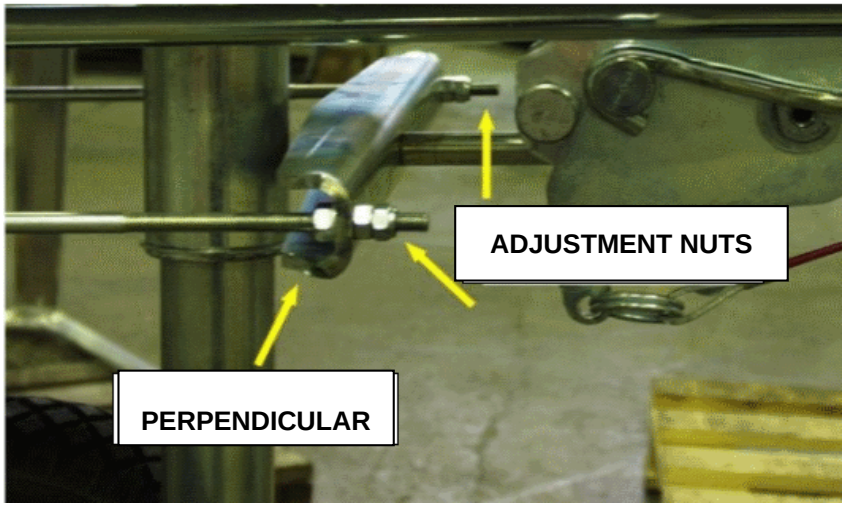


Turn the adjustment wheel, behind the hole marked by the arrow, until the wheel no longer can be turned by hand.

Turn the bolt counter-clockwise until the wheel can be turned freely.



Adjust the braking force with the nuts, keeping the brake balancer perpendicular to the tow-bar, so that both wheels will brake.



If you tighten the brake system too much, the brakes will overheat during transportation, and the the driving device will require more force.

We recommend performing a test run after the adjustment in order to ensure flawless operation of the brakes by braking 2-3 times.

Adjustment of the bearing clearance

The wheel bearings are lubricated for life and do not require any service.
(The bearings do not need any additional lubrication, and they neither need nor can be re-adjusted.)

Service intervals

500 km	(running in)
5,000 km	adjustment of the brakes, lubrication of the moving parts of the overrun
13,000 - 15,000 km	or every six months: a) check the brake linings for wear b) check the operation of the overrun brake c) lubricate the sliding parts of the overrun brake

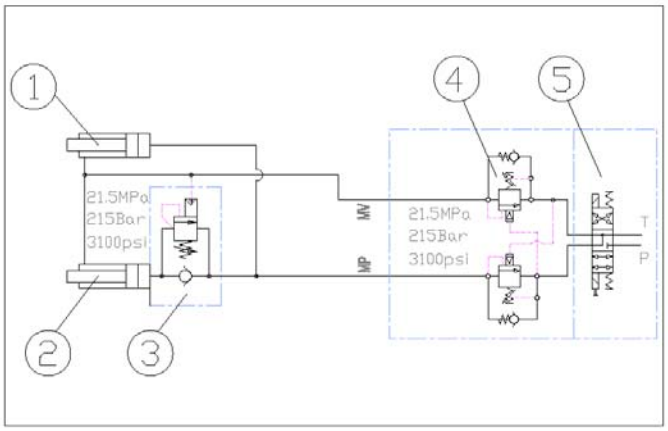
The service-life of the double row angular contact compact bearings is long and they are maintenance-free. Therefore, the bearings very rarely break under normal operating conditions. If a bearing failure, due to exceptional operating conditions, occurs, replace the entire brake drum assembly with the pressed-in bearings and locking nut.

Assign a specialized workshop for the work.

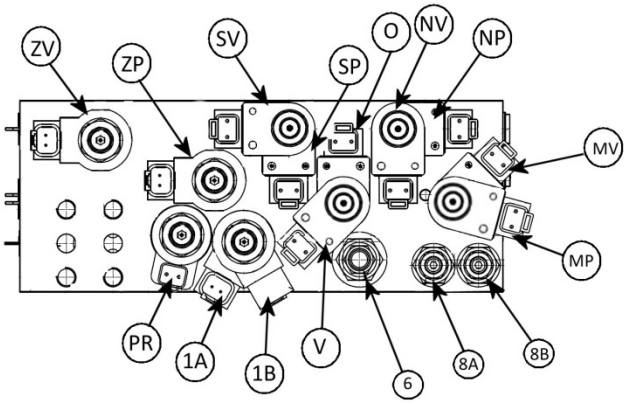
Turn the wheels at least once every 3 months to keep the lubricating film intact.

19.7 LEVELLING SYSTEM OF THE PLATFORM

- The platform is levelled by means of a so-called slave cylinder system:
  - the slave cylinder under the platform is controlled by a master cylinder
  - the platform stays in level position only if the valves in the system are tight
  - the levelling system comprises the following parts:



1. Mastercylinder
2. Slave cylinder
3. Load regulation valve
4. Double load regulation valve (8A/8B in the picture presenting the block)
5. Electric directional valve



- If the platform, viewed by the operator, drifts forwards, the reason can be:
  - a leak in the slave cylinder's double load regulation valve (on the piston rod side) towards the electric directional valve (which is by design not tight)
  - an internal leakage in the cylinder

- If the platform, viewed by the operator, drifts backwards, the reason can be:
  - a leak in the load regulation valve (4) on the piston (bottom) side of the slave cylinder towards the electric directional valve (5) (which is by design not tight)
  - an internal leakage in the cylinder

The leak will cause drifting of the platform until the load regulation valve (3) under the platform closes. The closing is caused by dropping of the pressure on the piston rod side to the opening ratio, which is 5:1 If the valves are not tight, refer to the point “Load holding and load regulation valves” in the service instructions.

Settings of the load regulation valves:
- the opening pressure of the double load regulation valves (4) is 21.5 MPa (215 bar)
- the opening pressure of the load regulation valve (3) under the platform is 21.5 MPa (215 bar)

Do not adjust the settings of the valves.

19.8 REGULAR SERVICE

The lift shall be serviced regularly at intervals of 11-12 month.

Under demanding conditions where moist, corrosive substances or corrosive climate may speed up the deterioration of the structure and induce malfunctions, the inspection must be performed more often and the influence of corrosion and malfunctions must be reduced by using appropriate protective means.

Only technical specialists who are familiar with the structure and the operation of the lift are allowed to maintain the lift.

We recommend turning to the service staff of the dealer.

SCHEDULE FOR REGULAR SERVICING

1. Clean the lift thoroughly before the service

The hydraulic and electric appliances must not be dismantled if they are not clean. Any contaminants in the system may cause malfunctions later on. Wash the lift externally.

Be careful not to direct the high pressure water jet straight to the electric appliances, such as the control centres on the chassis and on the platform, relays, solenoid valves and limit switches.

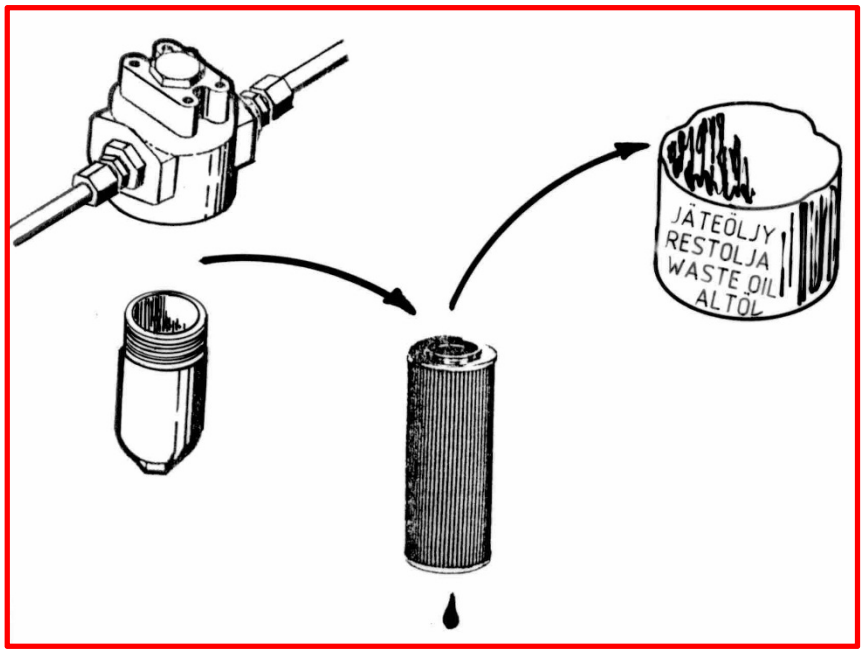
- use pressure air to dry the electric devices, hydraulic connectors etc. before opening them
- apply appropriate moisture repellent to the electric appliances after the drying
- always protect the piston rods with e.g. CRC3-36 anti-corrosive agent after washing with a solvent

Remember cleanliness.

2. Change the hydraulic oil and replace the filter

(protect your skin against the hydraulic oil)

- remove the plug and drain the oil tank with the lift's all cylinders fully retracted
- clean and rinse the oil tank with suitable agent
- replace the pressure filter



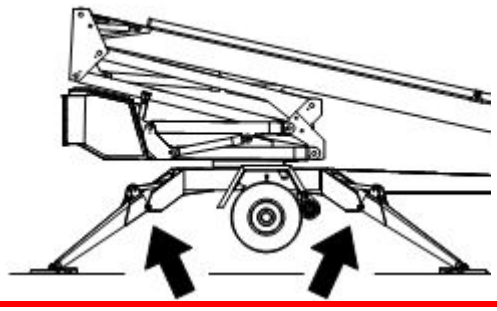
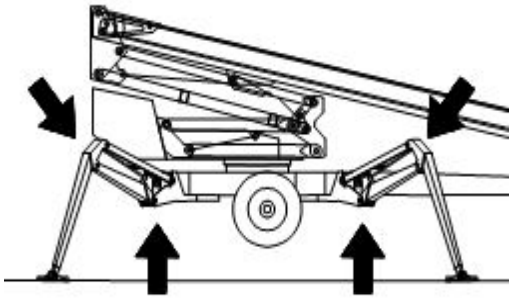
- install the drain plug
- refill the tank with fresh oil, the volume required for change is about 20 litres (factory filling Mobil EAL 32)
  The viscosity class of the hydraulic oil must be ISO VG32 or ISO VG15 and the oil must meet the requirements according to DIN 51524- HLP. Material Safety Data Sheet EXXON MOBIL no. 581017-60
- never mix different oil sorts
- if necessary, top up hydraulic oil to the level with the upper edge of the level eye, while the lift is in the transport position.

3. Check the hydraulic hoses and pipes

Replace any hoses with external damage or clashed pipes. Check the connections.

4. Inspect the joints of the support outrigger

- lower the outriggers slightly
- swing the outriggers back and forth in the horizontal plane and check the joints for play

160XT and 180XT	210XT
	

- check the operation and condition of the limit switch mechanisms on the outriggers
- replace any worn out parts
- lubricate the joints (see point “Lubrication plan”)

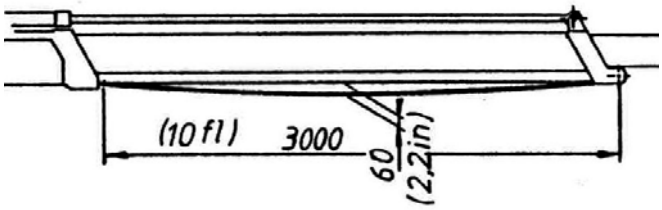
Lower the outriggers to the support position.

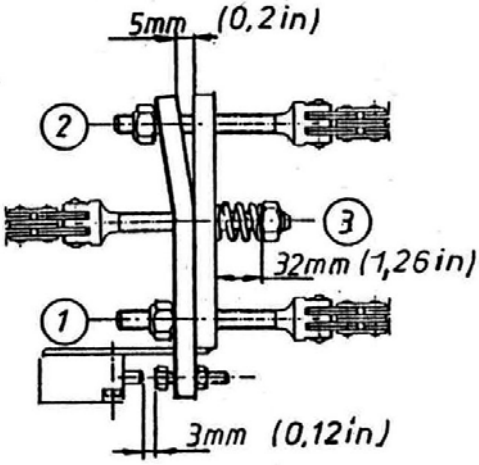
5. Inspect the cylinders, and lubricate the joint bearings (see ”Lubrication plan”)

- drive the lifting cylinder into its upper position from the chassis control centre, and check the connections for tightness and the condition of the piston rod
- drive the lifting cylinder into its lowest position from the chassis control centre, and check the connections for tightness
- retract and extend the telescope cylinder from the chassis control centre, and check the condition and tightness of the cylinder
- lubricate the joints of the lifting cylinder, the telescope cylinder and the levelling cylinders
- extend the articulated arm cylinders from the control centre on the chassis, and inspect their condition and tightness
- inspect the outrigger cylinders and lubricate their joints

6. Inspect the boom and the frame

- with the telescope extended, inspect the platform, its attachment and the boom
- inspect the joints of the boom and the play of the sliding pads – readjust if necessary. Lubricate the sliding surfaces
- check the condition, locking and adjustment of the Flyer-chains
- make sure that the unloaded Flyer-chain is properly attached to the boom by pulling the chain by hand with the boom at its maximum length





- inspect the turning device and its attachment, lubricate the turning bearing and the gear ring
  Remove the crescent-shaped covers from the underside of the lift, and lubricate the turning bearing nipples (4 pieces).

Excess grease pressure may press out the turning bearing seal.

- check the turning bearing play
  Max. allowed axial play is about 1 mm.
- check the attachment bolts of the turning device for tightness:

M16, 280 Nm
M12, 150 Nm

If you have to turn open or tighten the attachment bolts, do not forget to use bonding adhesive (tighten crosswise)

- check the chassis and the welded seams on it; especially around the turning device and attachment points of the outriggers
- inspect the outriggers.
- check the tow-bar, in particular its attachment to the chassis

- lubricate the bearings of the boom and outrigger joints

7. Check the overrun

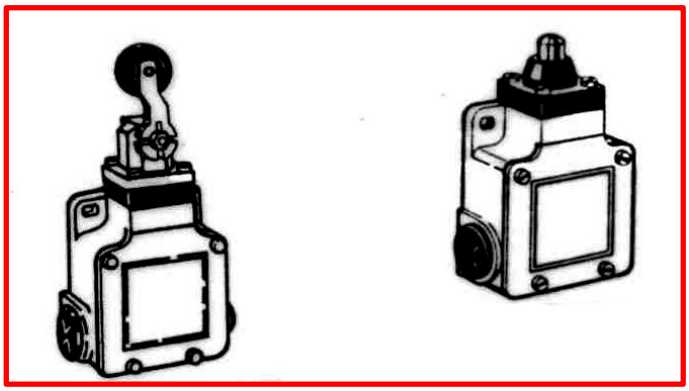
- attachment of the overrun
- clearance
- condition of the towball-coupling
- condition of the locking device
- check that the overrun brake mechanism moves freely

8. Inspecting the axle and the suspension

- check the attachment of the axle
- check the condition of the rubber absorbers and the torsion arms

9. Inspecting the safety devices

- check the attachment and the condition of the limit switches externally



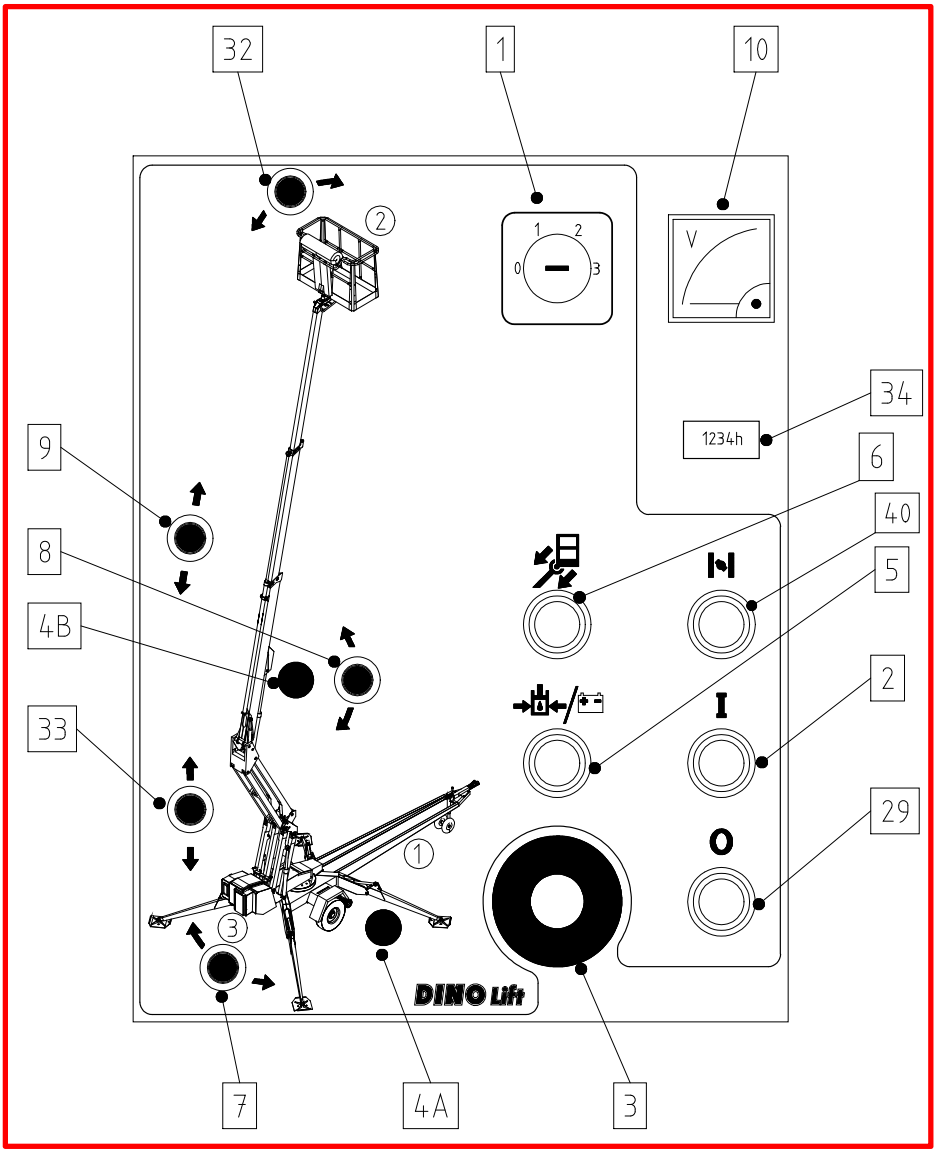
- from the tow-bar (transport position of the platform, RK3)
- safety device (RK4 and RK5)
- support outriggers (RK11, RK12, RK13 and RK14)
- boom (RK7 and RK8)

10. Operation of the safety devices from the chassis control centre

- lift the platform slightly up from the transport position

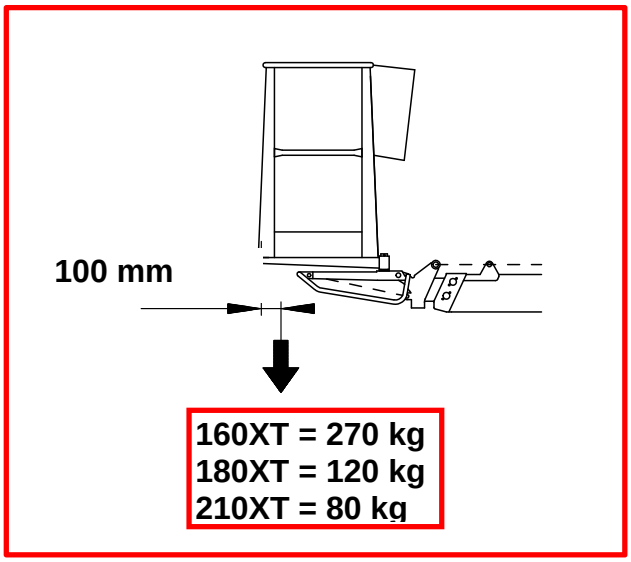
- the outriggers must not operate in any position of the selector switch

- lift the boom and test the following:
  1. emergency stop (3)
  2. emergency descent; retracting the telescope (6)
  3. emergency descent; lowering the boom (5 and 8)



- bring the boom to the transport position and lift the outriggers with the driving device connected.
- the boom must not operate in any position of the selector switch
- disconnect the driving device and lower the outriggers (bring the lift to a level position)

- put a load onto the platform as shown in the picture



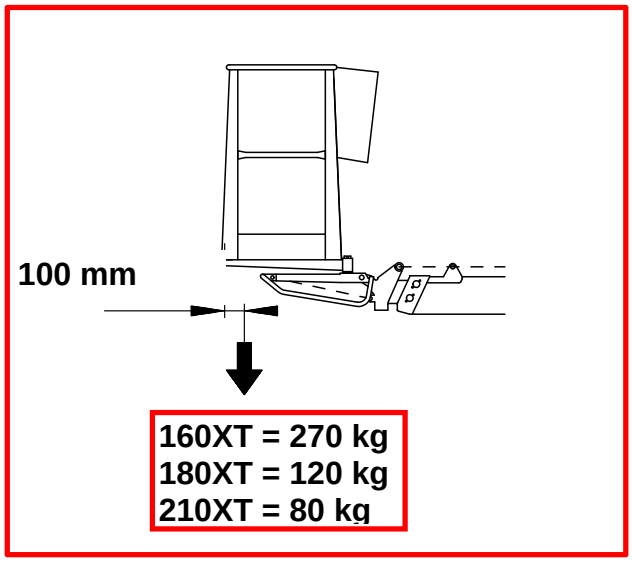
- lift the boom and extend the telescope
  The movement stops as soon as the red outreach limit signal light lights up (at max. outreach).

Now:

- the lifting of the boom should be operational - the lowering of the boom must NOT be operational
- the retraction of the telescope should be operational - the extension of the telescope must NOT be operational

19.8.1 TESTING THE LOAD LIMIT SWITCHES RK4 AND RK5

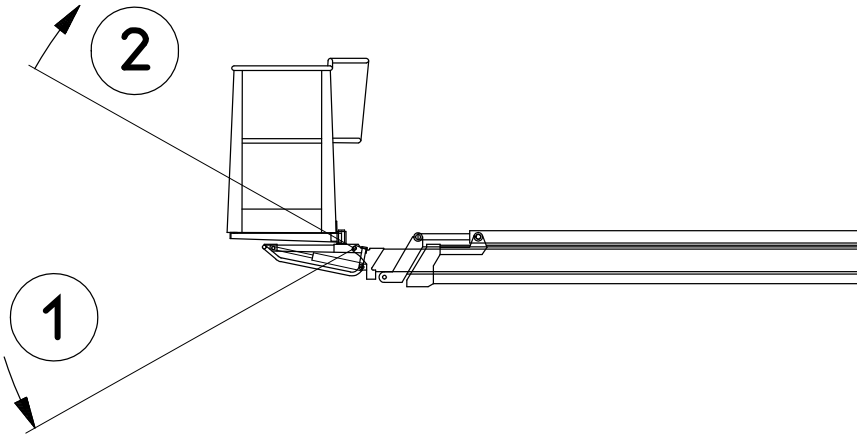
Put a carefully weighed load onto the platform as shown in the picture.
Place it at a distance of 100 mm from the rear edge of the platform.



Drive the boom to a horizontal position from the chassis control centre.

Lift and lower the rear edge of the platform using the levelling function.

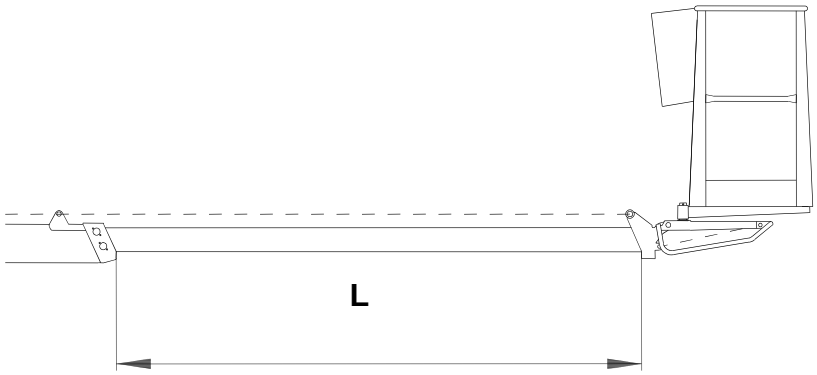
1. **Lowering the rear edge of the platform**
2. **Lifting the rear edge of the platform**



Using the levelling function, drive the platform to a horizontal position, ending the procedure by lifting the rear edge.

Adjustment method I:

Extend the telescope until it stops. Do not correct the position of the platform.
Measure the length of the projecting part of the telescope extension (L).

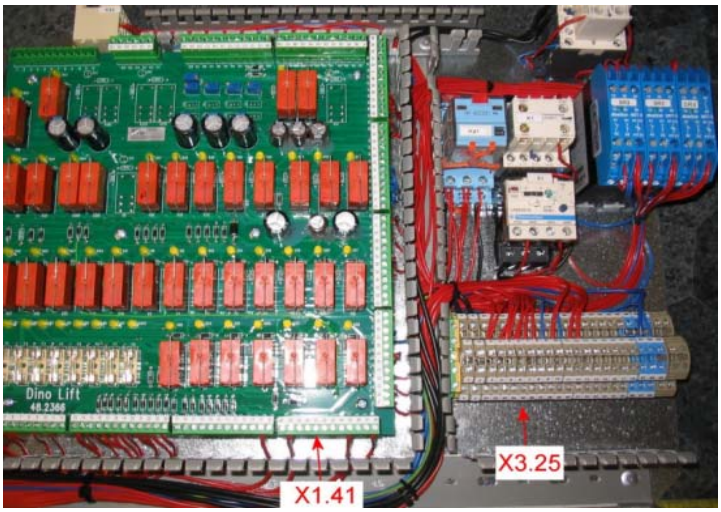


160XT: L = 2,000 mm ±50 mm
180XT: L = 2,450 mm ±50 mm
210XT: L = 3,100 mm ±50 mm

Make sure that a red signal light on the platform is illuminated.

- the second safety limit switch (RK5) backs up if the outreach limit switch (RK4) fails

- disable the RK4 for testing by disconnecting the conductor from the terminal X1:43 and connecting the terminals X3:25 and X1:41 inside the chassis control centre with a jumper lead In addition, connect the points X1 and X2 of the relay SR3 using another jumper lead.



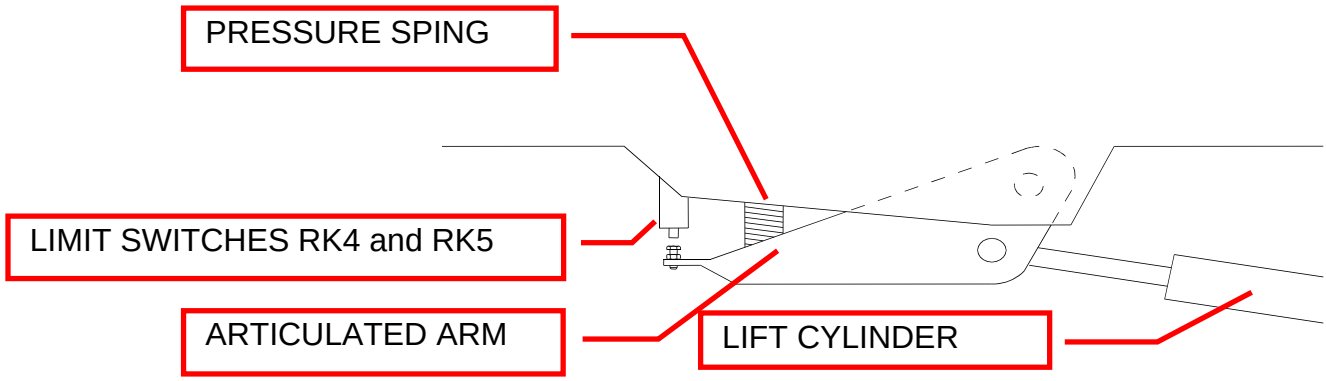
Remember to restore the operation of the RK4 by connecting the conductor to the terminal block X1:43 and removing the jumper leads.

- retract and extend the boom and measure the length of the telescope extension's projecting part
The measure must be:

160XT: L = 2,250 mm ±50 mm
180XT: L = 2,900 mm ±50 mm
210XT: L = 3,600 mm ±50 mm

- if the projecting part is too long, adjust the limit switches and secure them again with a seal

ADJUSTING THE OVERLOAD LIMIT SWITCHES



Always check the operation of both limit switches in connection with the service.

Adjustment method II

Setting the RK5:
- undo the RK4 as much as necessary to ensure that the RK5 certainly trips first

- extend the boom and measure the length of one projecting part of the telescope extension (L)

  The measure must be:

  160XT: L = 2,250 mm ±50 mm
  180XT: L = 2,900 mm ±50 mm
  210XT: L = 3,600 mm ±50 mm

- tighten the locking of the adjustment screw and check once more the settings

Setting the RK4:
- set the RK4 to trip before the RK5

- extend the boom and measure the stroke

- The measure must be:

  160XT: L = 2,000 mm ±50 mm
  180XT: L = 2,450 mm ±50 mm
  210XT: L = 3,100 mm ±50 mm

- tighten the locking of the adjustment screw and check once more the settings

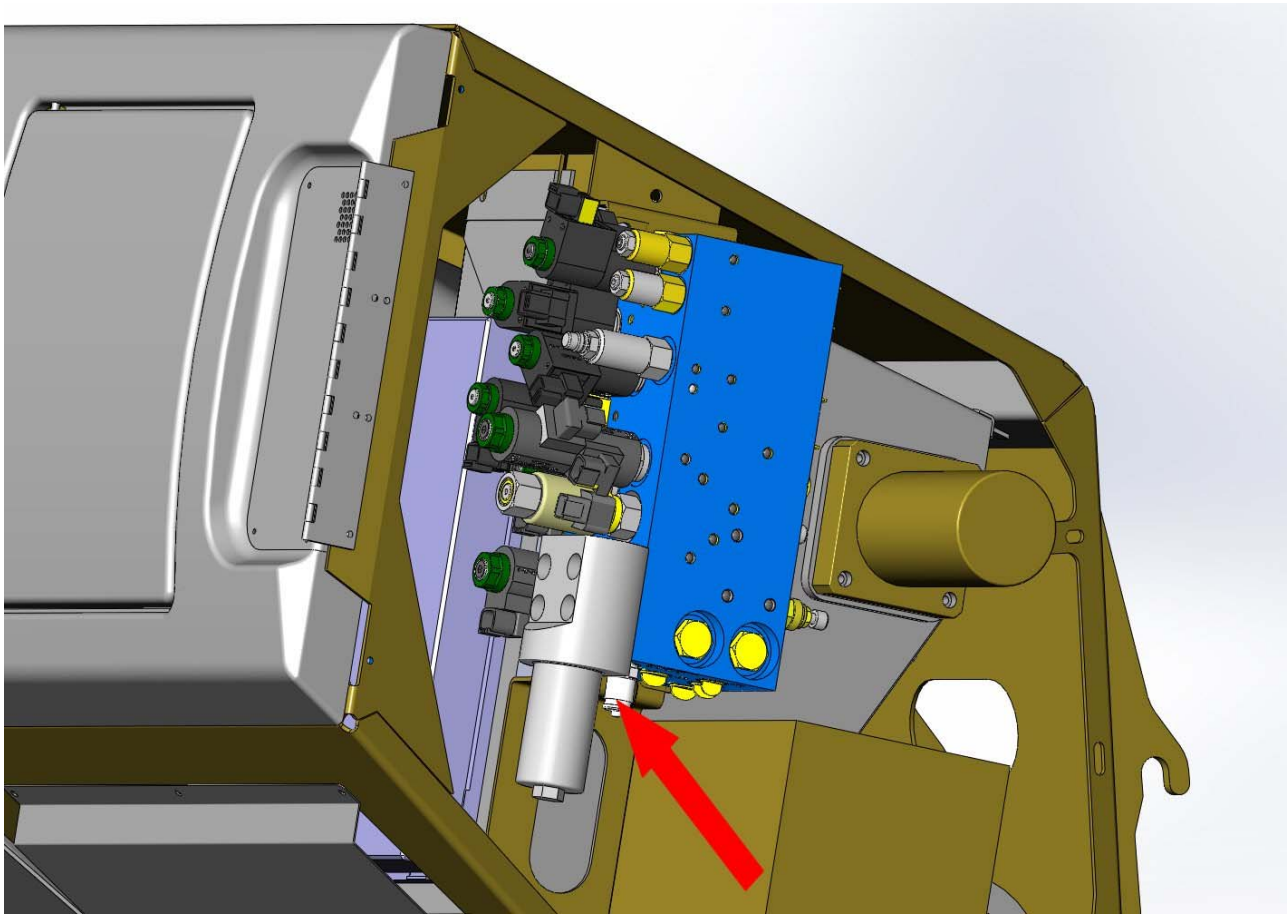
- apply a safety wire to the adjustment screws in such a manner that it will not be possible to unscrew the screws away from the limit switches

- apply a seal on the wire

- put the cover in place

11. Measuring the pressure

- connect the pressure gauge to the measuring point (inlet MP)



- max. pressure of oil at the operating temperature (40-60 °C) is 20-21,5 MPa (205-215 bar)
- the turning pressure is 5.5-7,0 MPa (55-70 bar)
- if you have to readjust the pressure, secure the new setting with a seal

12. Check the operating controls on the platform

- check the overall condition of the electric appliances inside the box and spray with moisture repellent, if necessary
- check the cables and the tightness of the cable clamps
- test the sound signal, the emergency stop and the emergency descent
- test all the movements
- test the operation of the overload limit switches before lifting the boom

13. Warning stickers and adhesive tapes

- make sure that all the warning stickers and adhesive tapes are legible, replace if necessary

14. Inspect the brakes and the driving device

- remove the wheels
- clean the brake system and check the settings
- check that the brake shoes can move, and that their springs properly return them
- replace any worn out linings
- check the condition of the driving device and lubricate the joints
- put the wheels in place and tighten the wheel bolts Remember to re-check the tightness of the wheel bolts after a drive of about 100 km.

Wheel bolts:
160XT = 90 Nm
180XT and 210XT = 325 Nm

- check the tyre pressure:

On the rear axle: 270 kPa (2.7 bar)
On the tow-bar jockey wheel: 250 kPa (2.5

- check the free movement of the overrun brake and the parking brake
- check the safety wires

15. Traffic lighting

- check the condition of the lights and the reflectors

16. Anti-corrosion treatment

- repeat the anti-corrosion treatment using e.g. Tectyl 210R anti-corrosion agent

17. Test-run

- perform a test-run with a load defined in the loading instructions.

Test load:
160XT = 270 kg
180XT = 120 kg
210XT = 80 kg

Check the structures after the test-run.

18. TEST PROTOCOL

- draw up a test protocol, save your own copy, and give the other copy to the customer

20 INSPECTION INSTRUCTIONS

All lifting equipment and lifting gear must be inspected in accordance with the national regulations before using them at a construction site.

Keep a journal of any notable shortcomings and defects observed and advise the foreman of them.

20.1 FIRST INSPECTION

The initial inspection and test loading of the Dino aerial work platforms is performed by the manufacturer. A protocol, drawn up during the inspection, will accompany the lift.

20.2 DAILY INSPECTION (START-UP INSPECTION)

To be always performed at a new worksite and in the beginning of every work day.
The user of the lift shall performed this inspection.
During inspection, attention shall be paid to the following issues:

- establishing the load-bearing capacity of the ground at the lifting site (see the indicative table “Maximum permissible ground pressure for different soil materials”)
- verification of the lift's standing stability
- controlling the due operation of the position indicator
- testing of the emergency stop system's operation both from the platform and the chassis control centres.
- testing the emergency descent system's operation both from the platform and the chassis control centres
- testing the alarm signal
- checking the warning and signal lights
- checking the operation and cleanliness of the lights and reflectors
- checking the condition of the operating controls and testing of all work movements
- checking the condition of the access routes, the platform gate and the handrails
- checking the operation of the load limit switches (refer to the service instructions).
- checking the limit switches preventing the operation of the boom movements (refer to the service instructions)
- checking the limit switches preventing the operation of the boom movements (refer to the service instructions)
- checking the hydraulic system for tightness
- testing of the brakes
- checking the structures visually
- observe the location of nearby power lines (for safe distance see “General safety regulations”)

20.3 MONTHLY INSPECTION (MAINTENANCE INSPECTION)

This inspection shall be performed by a person who is well familiar with the lift.
Task list for the inspection:

- perform the daily inspection measures
- check the attachment points of the boom and the platform
- check the operation and condition of the platform's levelling system
- inspect visually the load-bearing structures
    - chassis
    - turning device
    - telescope (fully extended)
    - support outriggers and their joints
    - welded seams for any cracks, corrosion or breaches
    - have the possible repair welds been properly executed
- check that the platform does not “drift” (refer to the service instructions)
- check that the outriggers do not “drift” (refer to the service instructions).
- check the hydraulic oil level
- check the electro-hydraulic rotary adaptor for oil leaks or seizures
- check the tyres and the tyre pressure
- check the wheel bolts and the rims
- check the turning gear for play
- check the operation of the driving device
- check the condition and attachment of the electric wires
- check the condition and attachment of the battery
- check the condition of the overrun
- make sure that all the signs, warnings and pictorials for the operating controls and the control equipment are in place, in good condition and clean
- check that the lift is clean all over

20.4 ANNUAL INSPECTION (REGULAR INSPECTION)

The inspection shall be performed by a skilled technician or an expert inspection body with documented evidence of competence (see point “Periodic inspection”). During inspection, special attention shall be paid to the the steel structures, the safety devices and the operating system.

Clean the lift before the inspection
The inspection includes the following measures and checks:

- measures of the daily and monthly inspections

- thorough inspection of the hydraulic system

  - inspection of the power unit
    - connect the pressure gauge to the measuring point in the hydraulic system
    - make the oil flow through the relief valve by driving one of the movements against the end stop
    - read the pressure from the gauge; when the oil is warm the pressure should be 21-21,5 MPa (210-215 bar)

  - load-holding check-valves on the outriggers
    - lift the device off the ground with the outriggers and measure the distance to the ground at each outrigger
    - step on the platform and extend the telescope, keeping the boom level Turn the boom round a few times; return it to its initial position and check that the distance between the ground and the outriggers has not changed.
    - lift the outriggers from the ground and leave them in this position for about 10 minutes
      Observe that the outriggers do not lower of themselves.

  - load-holding check-valve on the lift cylinder
    - lift the boom to an angle of about 45° from the chassis control centre, and extend the telescope
      Observe about 10 minutes that the boom does not lower of itself.

  - load regulation valve of the telescope cylinder
    - lift the boom and extend the telescope slightly from the chassis control centre; leave it in this position for about 5 minutes
    - make sure that the telescope does not retract of itself

  - load regulation valve of the levelling system
    - put a load of about 120 kg on the platform
    - lift and lower the boom 4-5 times
    - make sure that the position of the platform does not change

  - electric directional valves
    - operate all the boom and turning movements, and check that they all operate properly and that the movements stop as soon as the levers are released

- manually operated directional valves
  - check that the valves of the support outriggers and the driving device operate properly and no movement occurs when the spools are in the neutral position

- electro-hydraulic rotary adaptor
  - check the adaptor for tightness
  - check that the lever arm neither seizes nor is loose

- cylinders
  - lower the outriggers to the support position and check the condition of the piston rods and the wiper rings
  - lift the boom to its upper position and check the condition of the piston rod and the wiper ring of the lifting cylinder
  - lift the articulated arms to their upper position, and check the condition of the piston rods and the wiper rings of the cylinders
  - check the condition of the piston rod and wiper ring of the master cylinder in the slave cylinder system.
  - Lower the boom and check the condition of the piston rod and wiper ring of the slave cylinder under the platform.

- hoses
  - check the hoses for any leaks or chafing

- pipes
  - check that the pipes do not show any dents, leaks, trace of corrosion or chafing at the clamps
    Check that the pipes are properly fastened.

- connections
  - check the hose and pipe connectors for leaks

- inspect thoroughly the electric system
  - check that the control centre boxes are dry, clean and tight.
  - check the condition of the cable connections and their protection against moisture
  - check the condition and attachment of the limit switches
  - check the limit switch lead-throughs for tightness
  - check the connections of the electric valves
  - check the connections of the solenoid valves
  - perform visual inspection of all electric wiring
  - check the condition of the mains cable plug
  - check the condition of the electric motor.

- check the attachment points of the hydraulic cylinders
  - check the condition of the bearings and pins of the outrigger cylinders and the locking of the pins
  - check the condition of the lifting cylinder bearings and pins and the locking of the pins
  - check the condition of the articulated arm cylinder bearings and pins, and the locking of the pins
  - check the condition of the telescope cylinder bearings and pins, and the locking of the pins

Check the condition of the gas springs
- check the condition of the master and slave cylinder bearings and pins as well as the locking of the pins

- check the condition of the boom's joint
  - check the bearing and the pin of the boom joint and the locking of the pin
  - check the condition and attachment of the articulated arm joint pins and bearings

- check the support outriggers and their footplates
  - check the mechanical structure of the outriggers and the welded seams
    The structures must not show signs of deformations or cracks No fractures or cracks are allowed in the welded seams.
  - check the footplates for deformations, cracks or breaches
    Also check that the footplate can turn freely on its joint.

- inspect the boom
  - extend the telescope and check that there are no permanent deformations, dents or traces of substantial wear in the boom
  - also check the welded seams for wear, cracks or breaches
  - check the boom attachment for cracks or breaches
  - check the condition of the platform brackets
  - check the locking of the platform pin
  - check the condition and attachment of the flyer-chain, the locking of the pins and the tightness of the spring
  - check the condition of the cable chain, its clamp brackets as well as the tightness of the screw connections
  - check the play and attachment of the gliding surfaces on the boom.

- inspect the platform
  - general condition
  - check that the platform does not show signs of deformations, substantial wear or buckles
  - check that the handrails, the steps, the gate and the attachment of the gate are in order
  - check that the lock of the gate and the gas spring are in order
  - check the condition of the platform floor plate
  - check the platform carrier for notable buckles or deformations

- check all the protective covers
  - check the condition of the support outrigger cylinder guards
  - check the condition of the slave cylinder guard
  - check the condition of the boom end cover, turning device covers, chassis control centre cover, safety device cover, platform control centre cover and the rear light cover

- perform visual inspection of all the screw connections

- inspect the turning device
    - general condition
    - check the play and attachment of the angular gear
    - check the condition of the gear ring
    - check the play of the turning gear
    - check the tightening torque of the turning bearing´s attachment screws (M16 280 Nm, M12 150 Nm)
    - check the attachment of the turning motor

- check the condition of the chassis
    - general condition
    - check the attachment of the tow-bar to the chassis
    - check the condition of the overrun and its attachment to the chassis.
    - check the axle and its attachment to the chassis
    - check the attachment and condition of the brake wires and rods
    - check the rims, the tightness of the wheel bolts, the tyres and the tyre pressure
    - check the condition of the driving device, attachment of the parts and condition of the covers for electric components
    - check the condition of the transport support of the boom

- perform a test run, test all the operating controls, control the outreach in accordance with the instructions
  (See point “Inspection and adjustment of the overload limit switches”)

- also check the operation of the limit switches during the test run (refer to the service instructions)
    - the load-sensing limit switches on the safety devices
    - the limit switches on the outriggers, which prevent the operation of the boom movements
    - the limit switches on the tow-bar, which prevent the use of the outriggers

- after the test-loading and test drive make sure that the steel structures or other loaded parts do not show signs of structural defects, such as fractures or dangerous permanent deformations

- draw up a protocol of the regular inspection with following articles:

    1. inspection form
    2. data of repair welds
        a) date of repair
        b) repaired by whom
        c) what was repaired

- when the machine is ready for operation after the annual inspection, mark the inspection date on the inspection plate affixed to the lift

20.5 EXTRAORDINARY INSPECTION

(INSPECTION AFTER AN EXCEPTIONAL SITUATION)

The inspection is required if the lift has been damaged in a manner which may affect its strength or safe operation.

- in this case the lift shall be inspected according to the instructions for the annual inspection
- the lift shall be subjected to a test-loading and stability test
- a protocol shall be drawn up for the inspection

20.6 TEST LOADING INSTRUCTIONS FOR REGULAR INSPECTION

1. Place the lift on an even surface with good carrying capacity. Drive the outriggers to their lowest position (the minimum support width).

2. Turn the boom to the side from the tow-bar and lower it on the ground.

3. Put a weighed load (I) onto the platform.

Test load (I):
160XT = 270 kg
180XT and 210 XT = 215 kg

4. Lift the boom to as high as it goes and extend the telescope to its full length (maximum lifting height).

5. Lower the boom until the safety device stops the movement.

6. Turn the boom round over 360°.

7. Retract the telescope and lower the boom to a horizontal position.

8. Extend the telescope until the safety limit switch RK4 stops the movement. Establish the standing stability in this situation by turning the lift round over 360°.

9. Carry out the same procedure with load (II) on the platform.

Test load (II):
160XT and 180XT = 270 kg
210 XT = 80 kg

10. Compare the outreach with the reach diagram, and as necessary, readjust according to the instructions for "Adjustment of the overload limit switches".

After the above mentioned test loadings (case I and case II) and the subsequent inspection have been completed without finding any defects in the structure or stability of the lift, the lift may be used inside the permitted operating range presented in the reach/platform load diagram of this manual.

The max. allowed load on the platform is 215 kg

- in conjunction with the first, i.e. start-up, inspection, the lift shall be subjected to an overload test with an excess load of 50 % and after that the supporting structures shall be thoroughly inspected

- in conjunction with the annual inspection the lift shall be subjected to a regular inspection, a test-run and a test loading with maximum permissible load and a thorough inspection of the supporting structures

- the first inspection shall be recorded in the start-up inspection protocol and the test-run shall be recorded in the protocols for the annual and regular inspection

21 FAULT FINDING

FAULT	REMEDY

1. Electric motor does not start from the start button, although the selector switch is in position 1, 2 or 3

The emergency stop button has jammed in the lower position.	Pull up the button and re-start the motor from the start button.
Fuse F1 has blown.	Replace the fuse (10A).
No mains supply (230 VAC) to the selector switch.	Check the extension cords, possible distribution boards and fuses.
Fault current safety switch has tripped.	Reset the fault current safety switch.
Voltage is supplied to the selector switch, but is not transmitted further.	Check the operation of the selector switch and replace it, if necessary.
Voltage is supplied to the selector switch, and is also transmitted further.	Check the operation of the motor's control contactor and thermo-relay as well as the operation of the relays that control the operation of the contactor.
Limit switch RK7 for the telescope chain has disconnected the contactor circuit.	Check the operation of the RK7 and readjust according to the instructions.
No direct-current supply (12VDC).	Main switch turned off, turn on the switch.

2. None of the platform movements is operational, although the electric motor is running and the selector switch is in position 2 or 3

Green signal light for outriggers is not illuminated.	Check the operation of the outrigger limit switches RK11, RK12, RK13 and RK14.
Green signal light for the outrigger limit switches is illuminated, but the boom movements do not operate.	Check the operation of the safety relay SR2 for the outrigger circuit.
Boom has been overloaded.	Retract the telescope via buttons 6 or 21 until the platform returns inside its operating range (the green light in the platform control centre is illuminated).

FAULT	REMEDY

3. Outriggers do not move

Boom is not resting on the transport support.	Drive the boom onto the transport support.
The selector switch is in the wrong position.	Turn the selector switch to position 1.
Limit switch on the boom support has not closed.	Drive the boom onto the transport support and check the operation of the limit switch RK3.

4. Platform cannot be turned

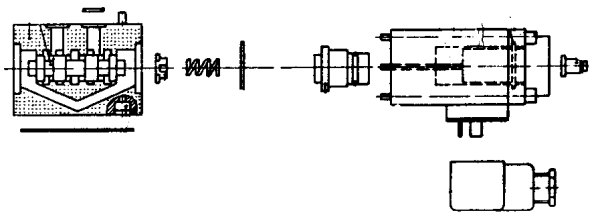
Automatic fuse F10 has tripped.	Reset the automatic fuse via its reset button.

5. No power supply to the lift, although the main switch is on and the selector switch is in position 1, 2 or 3

Power supply has not been activated.	Press the start button to activate the power supply.
One of the fuses F1, F11 or F12 has blown.	Change the fuse an press the start button.
Battery is flat.	Recharge the battery.

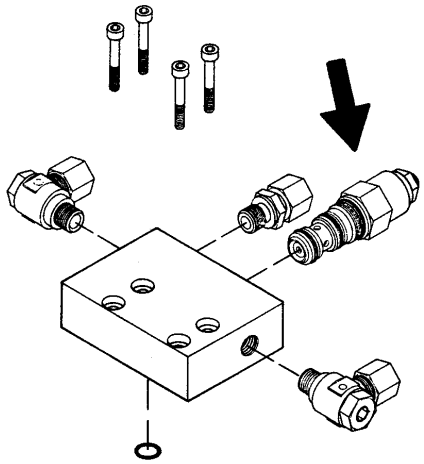
Check, whether the fault is in the electric system or in the hydraulic system.

6. Malfunctions of platform movements – only one of the movements can be operated

Irregular and indefinite malfunctions. 	Make sure that the hydraulic oil and the filter have been changed. Thoroughly clean the solenoid valve spools and housings (requires utmost cleanliness – particles, that cause malfunctions, cannot possibly be spotted with the naked eye). Also temporary contact failures in the joysticks may cause malfunctions. Spray with moisture repellent.
Lifting and lowering of the boom and the extension of the telescope are not operational, the red light is illuminated on the platform and in the chassis control centre, and the buzzer is audible.	The boom has been overloaded; retract the telescope and retry the operation (automatic reset).

FAULT	REMEDY

7. Boom drifts slowly downward

The “lock valve”, i.e. the pressure activated check valve, is leaking. 	Remove and clean the valve. Check the condition of the o-rings. Install the valve carefully – the correct tightening torque is 60 Nm. If necessary, replace the valve.

8. Power unit does not start

Battery is flat.	Recharge the battery.
The mains cable is plugged.	Disconnect the plug from the mains.
No direct-current supply (12VDC).	Main switch has been turned off, turn on the switch.

9. Power unit cranks but does not start

Fuel tank is empty.	Fill the fuel tank.
Choke is off.	Press the choke button (cold engine).
Throttle lever in idling position.	Increase the engine revolutions.

10. Boom cannot be lifted

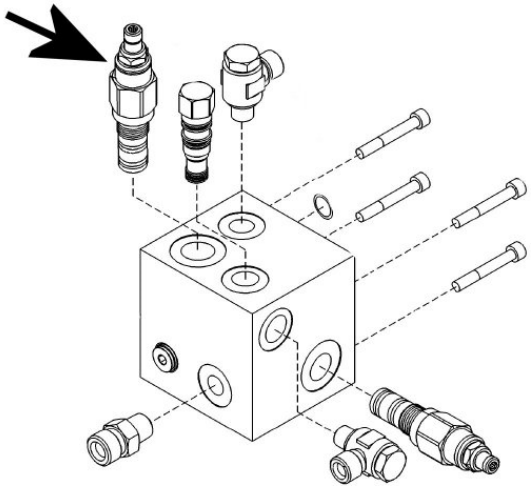
	Refer to item 4. Electric valve is open. Remedy as instructed above in conjunction with the seizure of the electric valve spool.
The lift turns when the lifting movement is activated.	Solenoid valve is stuck in the turning position. Wash carefully the spool and the housing.

FAULT	REMEDY

11. Telescopic movement does not operate

	Refer to item 4. Ensure that the solenoid valve for the telescope is not stuck in the centre (open) position.

12. Telescopic movement retracts slowly



Load regulation valve is leaking.	For remedy, refer to item 7 (lock valve).

13. Platform drifts backward

Double load regulation valve on the bottom side is leaking.	For remedy, refer to item 7 (lock valve).
Load regulation valve under the platform is leaking.	For remedy, refer to item 7 (lock valve).

14. Platform drifts forward

Double load regulation valve on the rod side is leaking.	Measures as above.

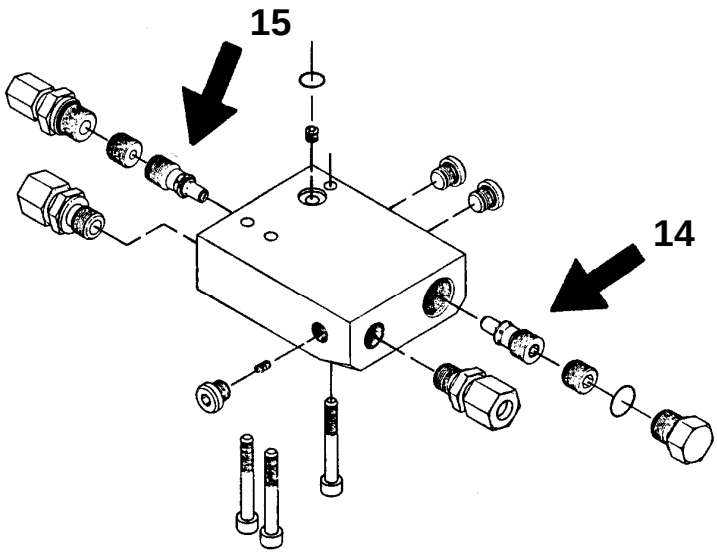
15. Outriggers do not move, although the selector switch is in position 1

Boom does not rest on the transport support.	Drive the boom onto the support.
Electric valve for movement of boom/outriggers does not operate (jams in the centre position).	For remedy, refer to item 4.

FAULT	REMEDY

16. Outrigger does not stay in the support position (see illustration)

Load regulation valve on the bottom side is leaking.	For remedy, refer to item 5 (lock valve). Tightening torque 55 Nm.



17. Outrigger does not stay in the transport position (see illustration)

Load regulation valve on the rod side is leaking.	Measures as above.

18. Driving device does not operate, although the selector switch is in position 1

Boom does not rest on the transport support.	Drive the boom onto the support.
Electric valve for the boom/outriggers movement does not operate (jams in the centre position).	For remedy, refer to item 4.

FAULT	REMEDY

19. Too low braking force

Too much play in the brake system.	Adjust the brakes.
Brake linings not yet run-in.	Pull the parking brake lever slightly and drive 2-3 kilometres.
Brake-shoes "glazed", dirty or oil on the friction surfaces.	Replace the brake-shoe sets. Clean the friction surfaces of the brake drum.
Overrun brake jams.	Lubricate.
Brake rod jammed or bent.	Repair.
Brake wires rusty or cracked.	Replace the wires.

20. Braking uneven and jerky

Too much play in the brake system.	Adjust the brake system.
Shock absorber of the overrun device faulty.	Replace the shock absorber.
Brake-shoe of the reverse automatics jams in its carrier.	Replace the brake-shoe in the carrier.

21. The brakes drag (only one of the wheels brakes)

Brake units wrongly adjusted.	Readjust the brake units according to the instructions. Also refer to point 17 for possible cause.

22. Lift brakes as soon as the engine speed is decreased

Shock absorber of the overrun device faulty.	Replace the shock absorber.

23. Reversing forced or impossible

Brakes have been adjusted too tight.	Adjust the brakes.

FAULT	REMEDY

24. Wheel brakes overheat

Brake system wrongly adjusted.	Adjust the brake system.
Wheel brake dirty.	Clean the wheel brake.
Overrun brake – the transmission rod of the overrun jams.	Dismantle, clean and lubricate the transmission rod.
Parking brake not completely released.	Release the parking brake completely.

25. Ball-coupling is not locked

Inner parts of the ball-coupling dirty.	Clean and lubricate.
Tow-ball of the towing vehicle too large.	Measure the tow-ball. According to DIN74058, the diameter of the ball must be max. 50 mm and min. 49.5 mm. If the measure is different or the ball is nor perfectly spherical, replace the ball.

Always, when changing brake-shoes, replace all the shoes on the axle.
Always, when assembling the brakes, make sure to install the springs, the brake-shoes and the expander in the right way.
When adjusting the brakes, turn the wheels forward (in the driving direction)!

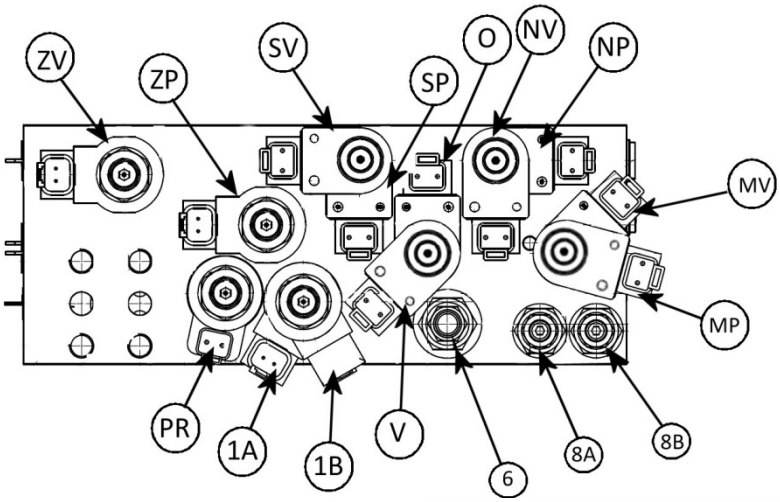
Naturally, there are many possible reasons for malfunctions, but the following are the most common:

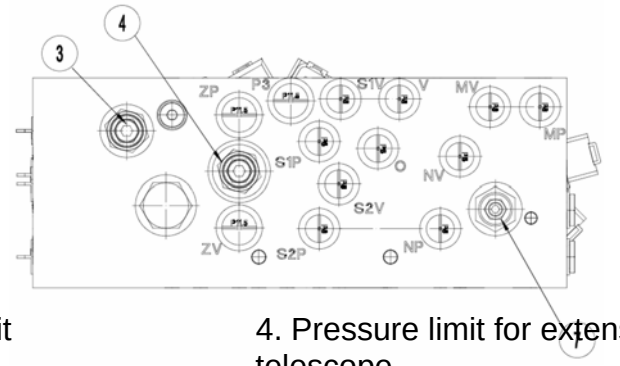
- low supply voltage (long and thin supply cable)
- the battery is flat (low voltage)
- contaminants in the hydraulic system
- loose electric connection or a contact failure caused by moisture

Keep the lift clean and protect it against moisture

22 GENERAL INFORMATION OF HYDRAULICS

Activation of any of the movements requires that three electric valves be in operation simultaneously. The retraction of the telescope is an exception, as it requires simultaneous operation of two valves only. The valves are: the flow regulation valve (PR), the selection valve boom/chassis (1B) and the control valve for the movement in question. Using the selection valve boom/chassis is not required for retraction of the telescope.





Valves:

3. Main pressure limit
4. Pressure limit for extension of the telescope
6. Pressure limit for turning
7. Adjustment of the platform's levelling speed
8A/B. Load regulation for levelling of the platform
1A/1B-selection "boom/chassis"
PR-Flow regulation valve (Propo)
SV/SP-Articulated arms
NV/NP-Lifting of the boom
MV/MP-Levelling of the platform
O/V-Turning of the boom
ZV-Retraction of the telescope
ZP-Extension of the telescope

To control the valves manually in the case of malfunction, press the pins at the end of the electric valves. Take into account, when you operate valves manually, that you can only activate those movements that bring the work platform lower.

If the movements operate when controlled manually, the fault is in the electric system of the operating controls or the valve spools are dirty, which causes jamming (refer to the fault finding scheme, point 6).

If none of the movements operate, the fault is in the hydraulic system.

23 ELECTRIC COMPONENTS

23.1 CHASSIS CONTROL CENTRE (LCB), RELAYS

K1: START CONTACTOR (M1) FOR THE ENGINE
Control circuit fuse F2 10A.

K2: AUXILIARY RELAY FOR THE EMERGENCY STOP BUTTON
Switches off the mains supply (230VAC).
Control circuit fuse F2 10A.

K3: TURNING THE BOOM CLOCKWISE
Control circuit fuse F9 1,6A (Platform control centre) and F4 10A (Chassis control centre).

K4: TURNING THE BOOM COUNTER-CLOCKWISE
Control circuit fuse F9 1,6A (Platform control centre) and F4 10A (Chassis control centre).

K5: AUXILIARY RELAY FOR THE “BOOM DOWN” MOVEMENT
Control circuit fuse F9 1,6A (Platform control centre) and F4 10A (Chassis control centre).

K6: RETARDATION OF THE “BOOM DOWN” MOVEMENT
Decreases the maximum lowering speed of the boom by connecting a resistor to the control circuit of the control card.
Control circuit fuse F9 1,6A (Platform control centre) and F4 10A (Chassis control centre).

K7: AUXILIARY RELAY FOR THE “BOOM UP” MOVEMENT
Control circuit fuse F9 1,6A (Platform control centre) and F4 10A (Chassis control centre).

K9: AUXILIARY RELAY FOR THE “TELESCOPE IN” MOVEMENT
Control circuit fuse F9 1,6A (Platform control centre) and F4 10A (Chassis control centre).

K10: AUXILIARY RELAY FOR THE “TELESCOPE OUT” MOVEMENT
Control circuit fuse F9 1,6A (Platform control centre) and F4 10A (Chassis control centre).

K11: LOWERING THE ARTICULATED ARMS
Control circuit fuse F9 1,6A (Platform control centre) and F4 10A (Chassis control centre).

K12: RETARDATION OF THE “ARTICULATED ARMS DOWN” MOVEMENT
Decreases the maximum lowering speed of the articulated arms by connecting a resistor to the control circuit of the control card.
Control circuit fuse F9 1,6A (Platform control centre) and F4 10A (Chassis control centre).

K13: RAISING THE ARTICULATED ARMS
Control circuit fuse F9 1,6A (Platform control centre) and F4 10A (Chassis

control centre).

K15: LEVELLING THE PLATFORM
Levelling the platform backward
Control circuit fuse F9 1,6A (Platform control centre) and F4 10A (Chassis control centre).

K16: LEVELLING THE PLATFORM
Levelling the platform forward
Control circuit fuse F9 1,6A (Platform control centre) and F4 10A (Chassis control centre).

K17: CENTRE POSITION ACTIVATION OF THE JOYSTICK
Switches off the voltage from micro-switches of the joystick, if the dead-man-switch DMK has not been pressed while the joystick is in the centre position.

K18: CONTROL RELAY FOR THE ADDITIONAL RESISTORS CONTROLLING THE MOVEMENT SPEED
The relay switches over the control voltage from the propo-card to the adjustable resistor for the boom/levelling of platform.
When the relay is active, the control voltage is routed via the resistor TR10 (movement speed of the boom from the chassis control centre)
As the relay is not active the control voltage is supplied through the TR9 resistor (levelling of platform)
Control circuit fuse F9 1,6A (Platform control centre) and F4 10A (Chassis control centre).

K19: CHANGE-OVER RELAY FOR THE CONTROL VOLTAGE OF THE PROPO-CARD.
As the relay is active the control voltage to the Propo-card is supplied via additional resistors. As the relay is not active the control voltage is supplied to the joystick by means of which the control voltage is adjusted to desired value with the help of adjustable resistors inside the joystick.
Control circuit fuse F9 1,6A (Platform control centre) and F4 10A (Chassis control centre).

K20: FUNCTION RELAY FOR THE OUTREACH LIMIT SWITCH RK4
Switches off the “telescope out” movement as the RK4 operates. Delay about 1,2 sec.
Control circuit fuse F2 10A.

K21: AUXILIARY RELAY FOR SWITCHING OFF THE "BOOM DOWN" MOVEMENT.
Safety limit switch RK4 controls the relay which switches off the spool control circuit of the relay K5.
Control circuit fuse F2 10A.

K22: AUXILIARY RELAY FOR SWITCHING OFF THE “TELESCOPE OUT” MOVEMENT
Closing tip of the safety limit switch RK4 controls the relay which switches off the spool control voltage of the relay K10, delay 2.5 sec.
Control circuit fuse F2 10A.

K23: CHANGE-OVER RELAY ON THE CHASSIS
Controls the solenoid valve for selecting on the chassis.
Fuse F2 10A.

K24: CENTRE POSITION ACTIVATION OF THE JOYSTICK
Depressing the dead-man-switch DMK switches off the control voltage from the spool of the relay K17, which would otherwise disconnect the control voltage of the micro-switches on the joystick.

K25: CONTROL RELAY FOR THE 1B-VALVE
Switches the voltage of 12VDC to the selector valve of the boom.

K25B: CONTROL RELAY FOR THE PR-VALVE
When driving the chassis, switches the voltage of 12VDC directly to the PR-valve. When driving the boom, the points direct the adjusted current from the control card to the PR-valve.

K26: RPM-RELAY
Controls the combustion engine revolutions. Increases the revolutions when the control movement is active.
Control circuit fuse F9 1,6A (Platform control centre) and F4 10A (Chassis control centre).

K27: AUXILIARY RELAY FOR CURRENT SUPPLY TO THE DRIVING DEVICE
The relay is controlled by the limit switch RK3.
Fuse F3 10A.

K28: CONTROL RELAY FOR THE SOLENOID OF THE EMERGENCY DESCENT UNIT
Switches on the voltage supply to the emergency descent unit solenoid SR1
Fuse F7 10A.

K29: PREVENTION OF DUAL CONTROL
The relay is controlled by the emergency descent buttons S11 and S13
Control circuit fuse F7 10A.

K31: SWITCH-OFF-RELAY FOR THE COMBUSTION ENGINE
Fuse F2 10A.

K32: SWITCH-OFF-RELAY FOR THE COMBUSTION ENGINE
Fuse F2 10A.

K33: AUXILIARY STARTING RELAY FOR THE DIESEL ENGINE

K34: RELAY FOR PREVENTING THE ELECTRIC MOTOR FROM RESTARTING
Prevents the electric motor from starting after the failure in AC power supply by switching off the control voltage from the control contactor of the motor.

K35: RELAY FOR PREVENTING THE ELECTRIC MOTOR FROM RESTARTING
Connects the voltage supply to the relay K34, if the voltage in the control circuit of the contactor is switched off.

K390: CHANGE-OVER RELAY FOR OPTIONAL FUNCTIONS
When the relay is active, the lifting-lowering movements of the articulated arms

are switched over to the joystick movements in the X-direction. When the relay is not active, the joystick movements in the X-direction control turning of the boom to the left and right.

K391: CHANGE-OVER RELAY FOR OPTIONAL FUNCTIONS
When the relay is active the in-out movements of the telescope are switched over to the joystick movements in the Y-direction. As the relay is not active lifting-lowering movements of the boom are switched over to the joystick movements in the Y-direction

K40: CONTROL OF THE COMBUSTION ENGINE CHOKE
Switches on the combustion engine choke.
Fuse F2 10A.

K41: SENSOR RELAY FOR THE AC SUPPLY
When the lift is connected to an AC supply, the relay switches off the start circuit and switches on the stop circuit of the combustion engine. The relay spool is controlled by the AC-voltage.

K42: START RELAY FOR THE COMBUSTION ENGINE
Fuse F2 10A.

K60: SWITCH-OFF-RELAY FOR THE FUNCTIONS CONTROLLED FROM THE CHASSIS CONTROL CENTRE
Switches off the voltage supply to all the other boom movements during levelling of the platform.

SR2: Safety relay monitoring the operation of the outriggers

The safety relay resets as soon as all the outrigger safety limit switches (RK11, RK12, RK13 and RK14) have closed. After that it is possible to operate the boom.

SR3: SAFETY RELAY FOR MONITORING THE OVERLOADING OF THE BOOM
Safety limit-switch RK5 controls the operation of the safety relay.

Overloading of the boom:	SR3 is disconnected. The safety relay is automatically reset upon return to the normal outreach range. The delay adjusted with the capacitors affects the tripping moment of the SR3.
If the RK5 fails:	SR3 is disconnected. The safety relay is not automatically reset but the due operation of the electric equipment must be checked. The delay adjusted with the capacitors affects the tripping moment of the SR3.

SR4: SAFETY RELAY FOR THE EMERGENCY STOP CIRCUIT
SR4 switches off control voltage from the engine control contactors.

The safety relay operates provided that the emergency stop buttons on the upper and lower control centres are in their upper positions and the chain limit switch RK7 is not active. In addition the contactors K1 and K2 must be inactive.

The safety relay will trip if one of the emergency stop buttons either on the upper or on the lower control centre is depressed or the chain limit switch is activated.

23.2 CHASSIS CONTROL CENTRE (LCB), SWITCHES

S1: LOCKING EMERGENCY STOP SWITCH
Stops all the other functions except the emergency descent and the sound signal, which remain operational.

S2: START SWITCH
Controls the contactor of the electric motor and start solenoid of the combustion engine if the combustion engine is used.

S3: STOP SWITCH
Disconnects the control voltage from the control contactor of the electric motor and the stop relay of the combustion engine.

S13: START SWITCH OF THE EMERGENCY DESCENT SYSTEM
Controls the solenoid for the emergency descent unit which starts the unit and supplies the control voltage to the control levers while the the emergency descent system is in operation.

S16: TURNING OF THE BOOM TO THE RIGHT - LEFT
Non-locking lever switch (chassis control centre).

S17: BOOM UP-DOWN
Non-locking lever switch (chassis control centre).

S18: TELESCOPE IN-OUT
Non-locking lever switch (chassis control centre).

S19: ARTICULATED ARMS DOWN-UP
Non-locking lever switch (chassis control centre).

S20: LEVELLING OF THE PLATFORM FORWARD-BACKWARD
Non-locking lever switch (chassis control centre).

S32: TELESCOPE IN
Non-locking button switch. After the SR3 has tripped, the telescope can be retracted by depressing the button.

S40: COMBUSTION ENGINE CHOKE
Non-locking button switch. Depressing the button keeps the choke of the combustion engine active.

23.4 CHASSIS CONTROL CENTRE (LCB), OTHER ITEMS

F1: 1.6A FUSE FOR ACTIVATION CIRCUIT OF THE TIMER CARD

F2: 10A CONTROL FUSE FOR START CIRCUIT AND MONITORING CIRCUIT OF THE OUTREACH

F3: 10A CONTROL FUSE FOR THE DRIVING DEVICE

F4: 5A FUSE FOR CONTROL LEVERS AND JOYSTICK IN THE CHASSIS AND PLATFORM CONTROL CENTRES

F5: 1.6A CONTROL FUSE FOR THE DRIVING DEVICE

F6: 10A CONTROL FUSE FOR THE SOLENOID VALVES

F7: 10 A CONTROL FUSE FOR THE EMERGENCY DESCENT CIRCUIT

F8: 10A CONTROL FUSE FOR THE COMBUSTION ENGINE

F12: TIMER CARD FUSE 16A

H3: YELLOW LED SIGNAL LIGHT
Indicates the operation of the outrigger limit switches RK11-RK14.

H4: RED LED SIGNAL LIGHT
Indicates the tripping of the SR3.

HM1: HOUR METER
Measures the running hours of the machine.

Q1: TURN SWITCH WITH KEY
Selector switch for choosing the operating location.
1 = chassis
2 = platform
3 = chassis centre

TC: TIMER CARD
Control card for supply voltage.
Disconnects the supply voltage from the lift after a preset delay (normally 1 hour)
Start buttons S2 and S6 are used for re-activation of the control voltage.

TR9: ADJUSTABLE RESISTOR
Adjustable resistor for the levelling speed of the platform.

TR10: ADJUSTABLE RESISTOR
Adjustable resistor for lowering speed of the boom.

TR11: ADJUSTABLE RESISTOR
Adjustable resistor for the movement speed when operating from the chassis centre.

TR12: ADJUSTABLE RESISTOR
Adjustment of the articulated arms' lowering speed.

U1: VOLTAGE METER
As the control voltage is connected the voltage meter indicates the alternating voltage reading.

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23.5 PLATFORM CONTROL CENTRE (UCB), RELAYS

K50: CONTROL RELAY FOR SIGNAL LIGHTS INDICATING THE STATE OF LOADING OF THE PLATFORM
The relay is controlled by the opening point of the limit switch RK4.

K51: TURNING THE PLATFORM TO THE LEFT
Controlled by the non-locking lever switch S36.
The control movement is stopped by the inductive end limit switch RK9 of the linear motor.

K52: TURNING THE PLATFORM TO THE RIGHT
Controlled by the non-locking lever switch S36.
The control movement is stopped by the inductive end limit switch RK10 of the linear motor.

23.6 PLATFORM CONTROL CENTRE (UCB), SWITCHES

DMK: DEAD-MAN-SWITCH

JST: JOYSTICK
As the right side of the rocker switch is depressed, the movements are: boom up - down and turn right – left)
As the left side of the rocker switch is depressed, the movements are: telescope in–out and articulated arms up–down.

S4: LOCKING EMERGENCY STOP SWITCH
Stops all the other functions except the emergency descent and the sound signal, which remain operational.

S5: STOP SWITCH

Disconnects the control voltage from the control contactor of the electric motor and the stop relay of the combustion engine.

S6: START SWITCH

Controls the contactor of the electric motor and start solenoid of the combustion engine if the combustion engine is used.

S10: SOUND SIGNAL SWITCH

S11: EMERGENCY DESCENT SWITCH
Controls the solenoid for the emergency descent unit which starts the unit and supplies the control voltage to the control levers while the the emergency descent system is in operation.

S12: LEVELLING OF THE PLATFORM FORWARD-BACKWARD
Control switch, non-locking lever switch.
The levelling is operated by pressing the button S29 and turning the lever switch S12.

S29: SELECTOR SWITCH FOR LEVELLING OF THE PLATFORM
Non-locking button switch.
Switches on the control voltage to button switch S12 as the switch is depressed.

S31: TELESCOPE IN
Non-locking pushbutton for retraction of the telescope.

S36: TURNING THE PLATFORM TO THE LEFT-RIGHT
Non-locking lever switch.
Controls the relays K14 and K15.
The turning is operated by pressing the button S29 and turning the lever switch S36.

S41: COMBUSTION ENGINE CHOKE
Non-locking button switch. Depressing the button keeps the choke of the combustion engine active.

23.7 PLATFORM CONTROL CENTRE (UCB), OTHER ITEMS

H1: GREEN LED SIGNAL LIGHT
The platform inside the operating range.

H2: RED LED SIGNAL LIGHT
The platform at the border of the operating range.

F10: AUTOMATIC FUSE FOR TURNING OF THE PLATFORM 4A

F9: JOYSTICK FUSE 1.6A

PR: SOCKET OUTLET ON THE PLATFORM 230VAC 16A.

ÄM2: BUZZER
Indicates the operation of the safety limit switch RK5 and the emergency stop switches S1 and S4.

23.8 LIMIT SWITCHES

RK3: LIMIT SWITCH ON THE BOOM SUPPORT
Prevents the operation of the outriggers and the driving device if the boom is not resting on the support in the transport position. Controls the relay K30.

RK4: SAFETY LIMIT SWITCH FOR THE ADJUSTED OPERATING RANGE
The operation of the limit switch stops the "boom down" movement and the "telescope out" movement.

RK5: BACKUP LIMIT SWITCH FOR THE SAFETY LIMIT SWITCH RK4.
Trips after the preset delay (2,4 seconds) the safety relay SR3 which controls the sound signal AM2 and switches off the control voltage to the limit switch RK4.

RK7: SAFETY LIMIT SWITCH FOR THE TELESCOPE CHAIN.
Operation of the safety limit switch stops the electric motor. The limit switch switches off the control voltage to the contactor K1 after which only the emergency descent unit will operate.

RK8: SAFETY LIMIT SWITCH “TELESCOPE FULLY RETRACTED”
The limits switch closes when the telescope is completely retracted.
If the RK4 or RK5 has failed, the boom cannot be lowered until the telescope has been completely retracted and the points of the limit switch RK8 have closed.

RK9: INDUCTIVE LIMIT SWITCH
Limits turning of the platform to the left by disconnecting the control voltage circuit for the relay K51.

RK10: INDUCTIVE LIMIT SWITCH
Limits turning of the platform to the right by disconnecting the control voltage circuit for the relay K52.

RK11-RK14: LIMIT SWITCHES ON THE OUTRIGGERS
The limit switch closes as soon as sufficent force is exerted on the outrigger.
Prevents the operation of the boom unless the outriggers are not firmly supported on the ground and all limit switches are not closed.

23.9 CONTROL CENTRE FOR THE DRIVING DEVICE (DCB)

S24: DRIVING STRAIGHT FORWARD AND BACKWARD
Non-locking lever switch.

S25: TURNING TO THE LEFT
Non-locking pushbutton.

S26: TURNING TO THE RIGHT
Non-locking pushbutton.

23.10 OTHER MARKINGS

B1: BATTERY 12VDC 44AH

E1: THERMORELAY FOR THE ELECTRIC MOTOR

F11: MAIN BATTERY FUSE 125A

J1: PLUG

M1: ELECTRIC MOTOR 230VAC 1.5kW

M2: EMERGENCY DESCENT MOTOR 12VDC
Max. operating time 10 min.

M3: MOTOR FOR PLATFORM TURN

PL: ROTARY ADAPTOR
The electric circuits between the chassis and the turning device go through the electric rotary adaptor.

SR1: Solenoid for the emergency descent unit
When energized, starts the emergency descent unit M2.

SPV: Main switch
Disconnects the plus terminal of the battery.

T2: Battery recharger
Charging voltage 13,8VDC 10A
Charges the battery if the mains supply is connected.

VVK: FAULT CURRENT SWITCH 25A 30 ms.

ÄM1: SOUND SIGNAL

25 ADJUSTMENT OF THE MOVEMENT SPEEDS

1. **Measuring devices required for the adjustment:**
   - volt-ohm-milliammeter with possibility to measure direct current (A)
   - screwdriver with narrow tip for adjusting the trimmer

2. **Disconnect the conductor 523 from the connector K25B.22 on the cover of the LCB centre. Connect the volt-ohm-milliammeter between the connector K25B.22 of the relay, and the conductor 523 as shown in pic01.**

3. **Connect the measuring leads to the direct current inlets of the volt-ohm-milliammeter, and turn the selector switch of the meter to the position (max. current I_{max}=2A).**
   Lift the machine off the ground with the outriggers for operating the boom.

4. **Turn the key-switch to position 3; the power unit does not have to be running.**

5. **Check that the adjustable resistors TR9, TR10, TR11 and TR12 on the circuit card of the main centre have been turned counter-clockwise to their extreme positions.**

CONTROL CARD SCREWS
1. Maximum current I_{max}
2. Minimum current I_{min}
3. Frequency adjustment
4. Intensity of frequency
5. Ascending ramp
6. Descending ramp

6. **Adjustment of the frequency (the lift in the boom-mode, the power unit is not running)**
   Turn at first the adjustment screw 3 on the control card to its minimum position (extreme position counter-clockwise). After that, turn it 1/4 round clockwise.

7. **Intensity adjustment of frequency (the lift in boom-mode, the power unit is not running)**
   Turn at first the adjustment screw 4 on the control card to its minimum position (extreme position counter-clockwise). After that, turn it 1/4 round clockwise.

8. **Adjustment of the ascending ramp (the lift in the boom-mode, the power unit is not running)**
   Turn at first the adjustment screw 5 on the control card to its minimum position (extreme position counter-clockwise). After that, turn it 1/5 round clockwise.

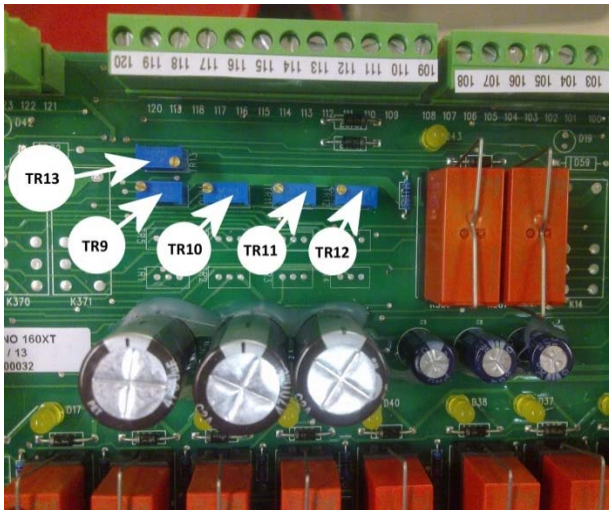
9. **Adjustment of the descending ramp (the lift in the boom-mode, the power unit is not running)**
   Turn at first the adjustment screw 6 on the control card to its minimum position (extreme position counter-clockwise). The descending ramp is not used.

10. **Adjustment of min. current of the control card (the lift in the boom-mode, the power unit is not running)**
    10.1 The intensity of current increases as the screw is turned clockwise.
    10.2 Adjust the minimum current to I_{min}=300 mA.

11. **Adjustment of min. current of the control card (the lift in the boom-mode, the power unit is not running)**
    11.1 the max. current is adjusted via the screw 1 on the control card
    11.2 drive the "boom up" movement
    11.3 carry out the adjustment during the lifting, the current increases as the screw is turned clockwise
    11.4 adjust the max. current to I_{max}=1,500 mA.
    11.5 start the power unit, and extend the telescope for 10 seconds
    Measure the stroke of the cylinder. The target is about 50 cm. If this cannot be achieved, you can try to increase the maximum current. The intensity of the current must not be too high, as then the adjustment range of the joystick will decrease.

12. The movement speeds are adjusted using the adjustable resistors on the circuit card in the main control centre. The speed of the following movements can be adjusted:

- TR9 = levelling the platform
- TR10 = the speed of the movements when controlled from the chassis control centre (affects the speed of all movements when controlled from the chassis centre)
- TR11 = lowering the boom
- TR12 = lowering the articulated arms



13. Adjustment of the movement speed from the chassis control centre (the lift in the boom-mode, the power unit is not running)

Drive the “boom up" movement and simultaneously adjust the intensity of current via the adjustable resistor TR10 to I_{lower}=1500 mA.

14. Adjusting the lowering speed of the boom

14.1 Drive the "boom down” movement and simultaneously adjust the intensity of current via the adjustable resistor TR11 to I_{lower}=1,250 mA.

14.2 Check the lowering speed of the boom -> start the power unit, and retract the telescope. Lift the boom until the floor of the platform reaches the height of 2,8 metres.

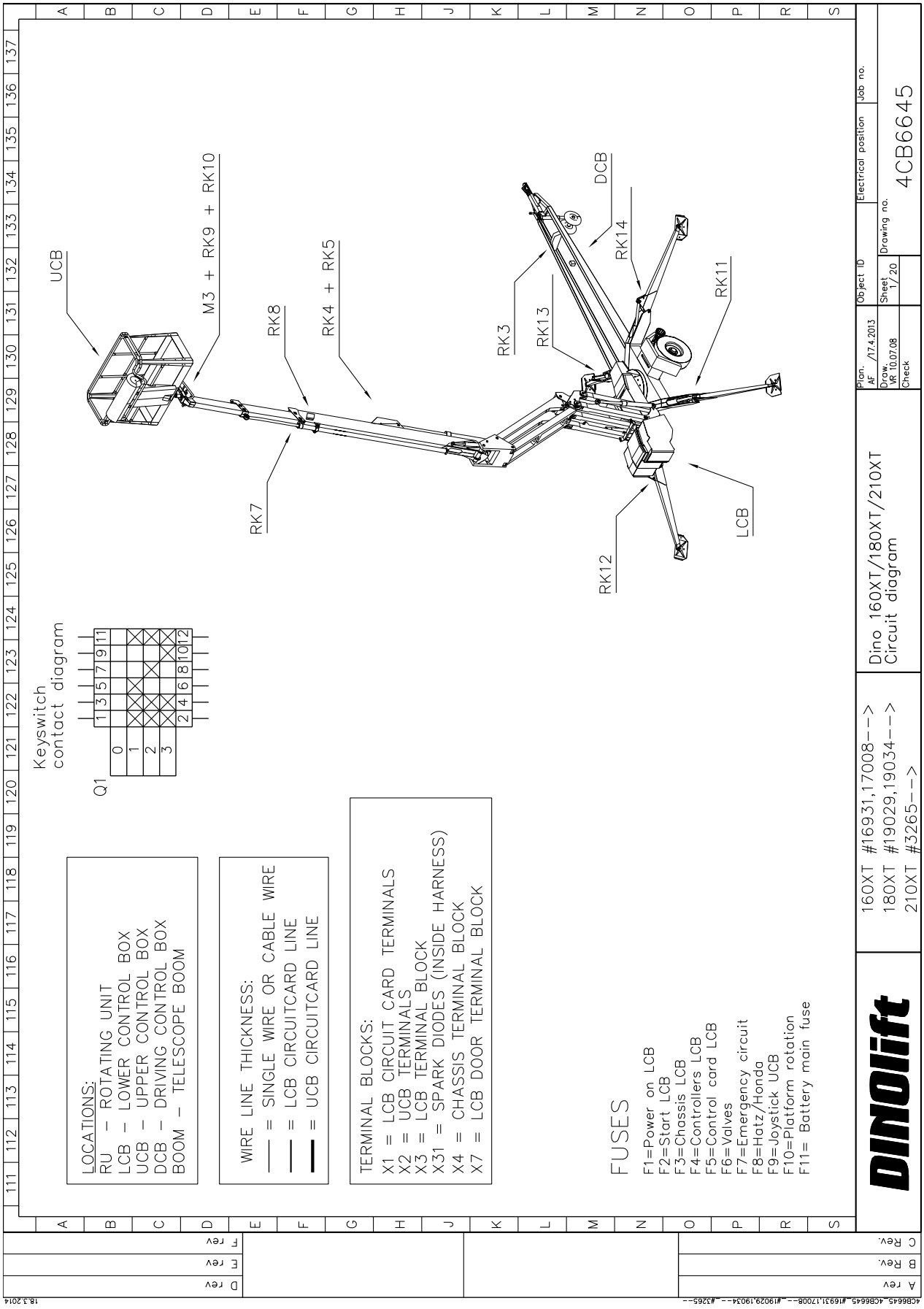
14.3 Lower the boom to its lowermost position (over a distance of 2 m). The lowering should take about 13 seconds. As necessary, adjust it via the trimmer TR11.

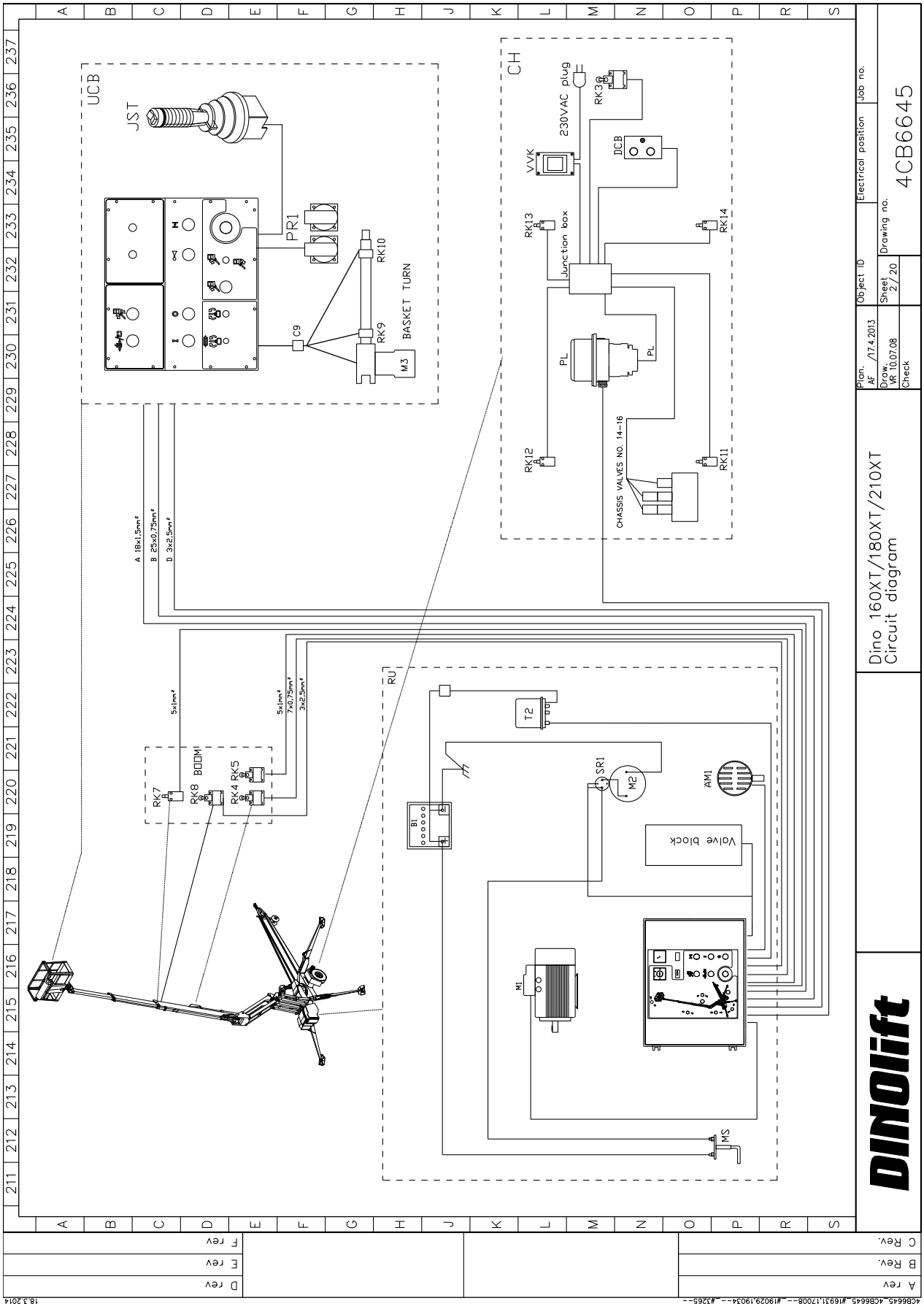
15. Lowering the articulated arms

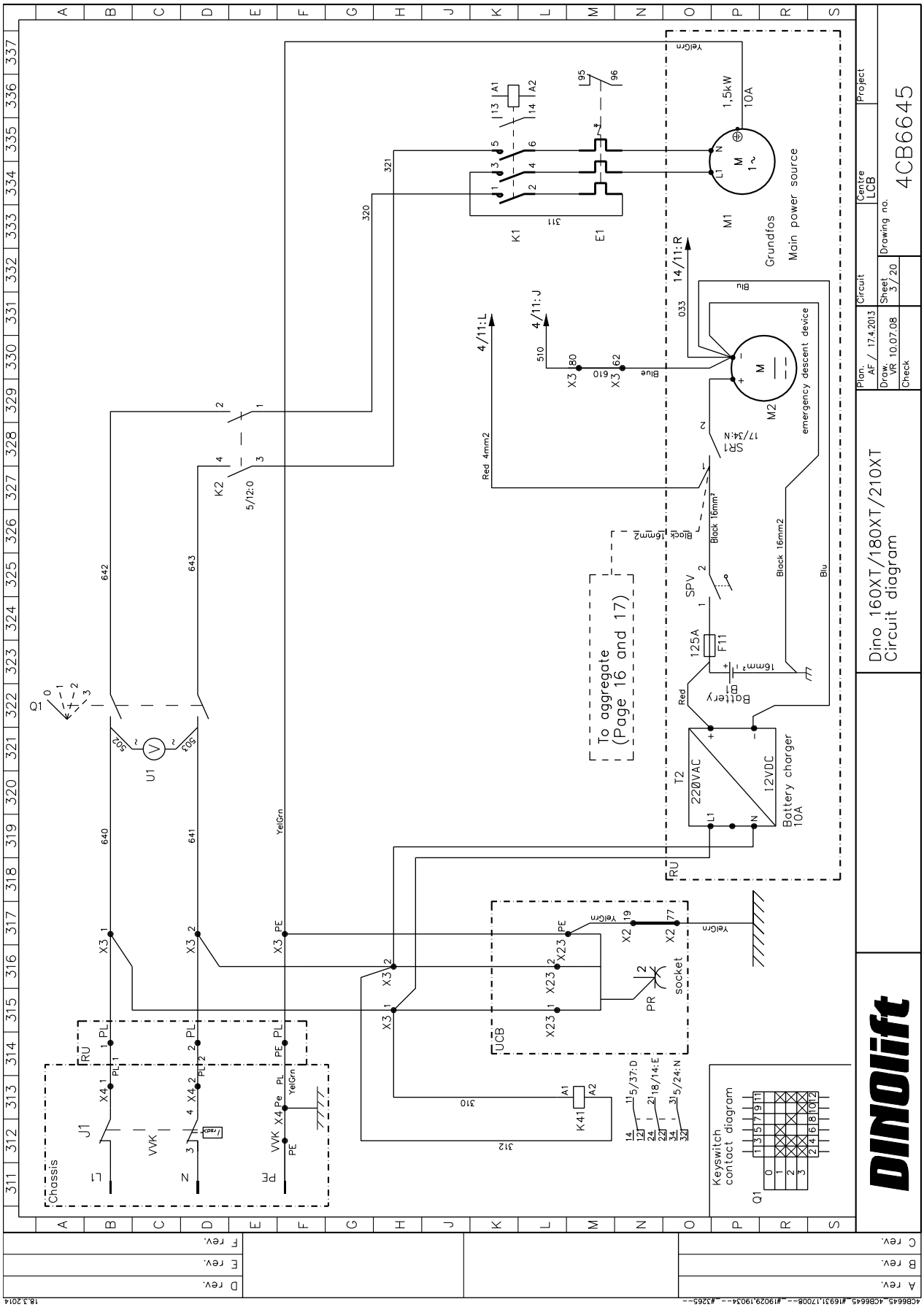
Drive the “articulated arms down” movement and simultaneously adjust the intensity of current using the adjustable resistor TR12 to I_{lower}=1400 mA. Lift the articulated arms to their highest position, lower them all the way down and measure the elapsed time. The time shall be 20 seconds. As necessary, set the time as specified via the trimmer TR12.

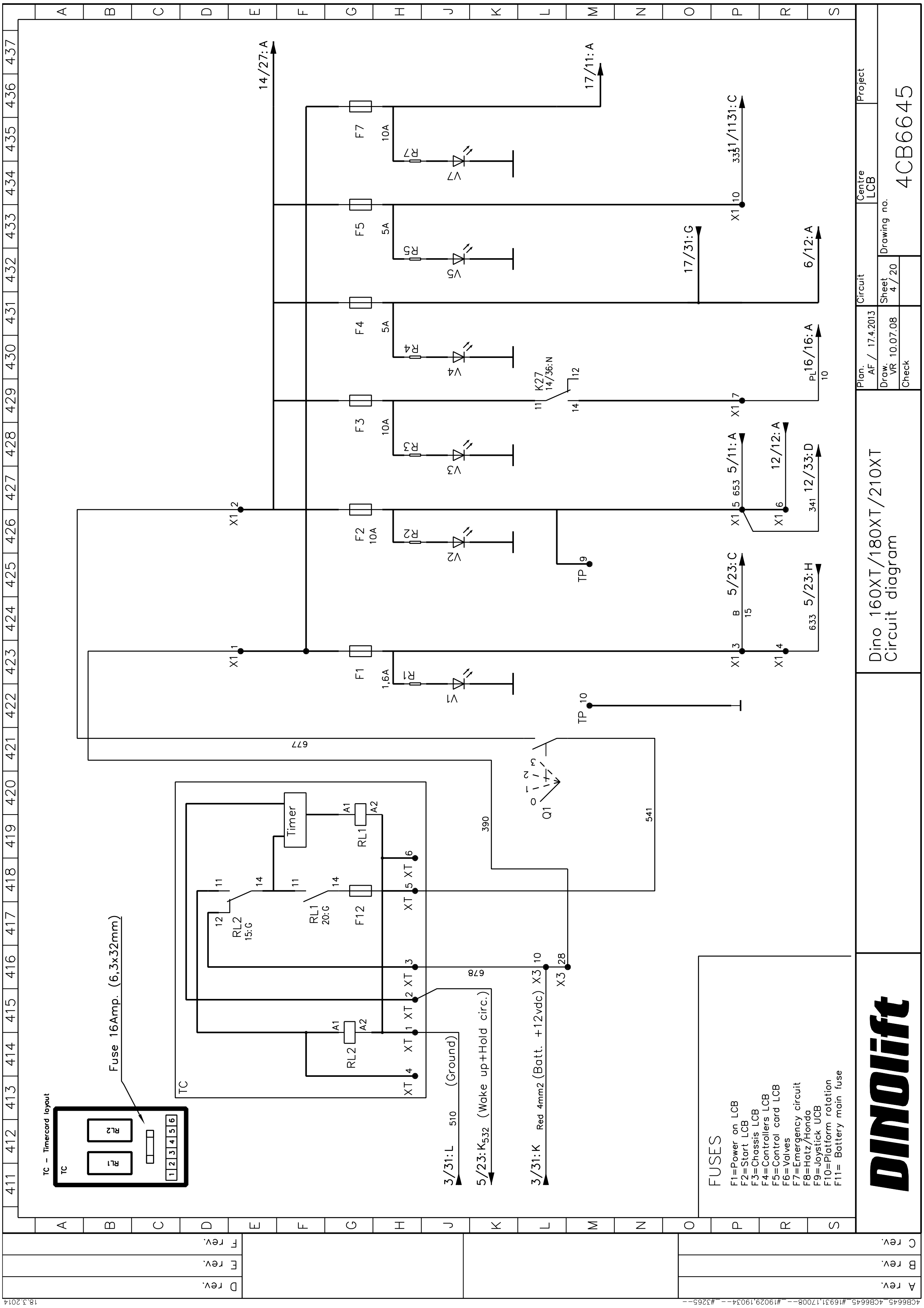
16. Finally, disconnect the meter, and reconnect the lead S23

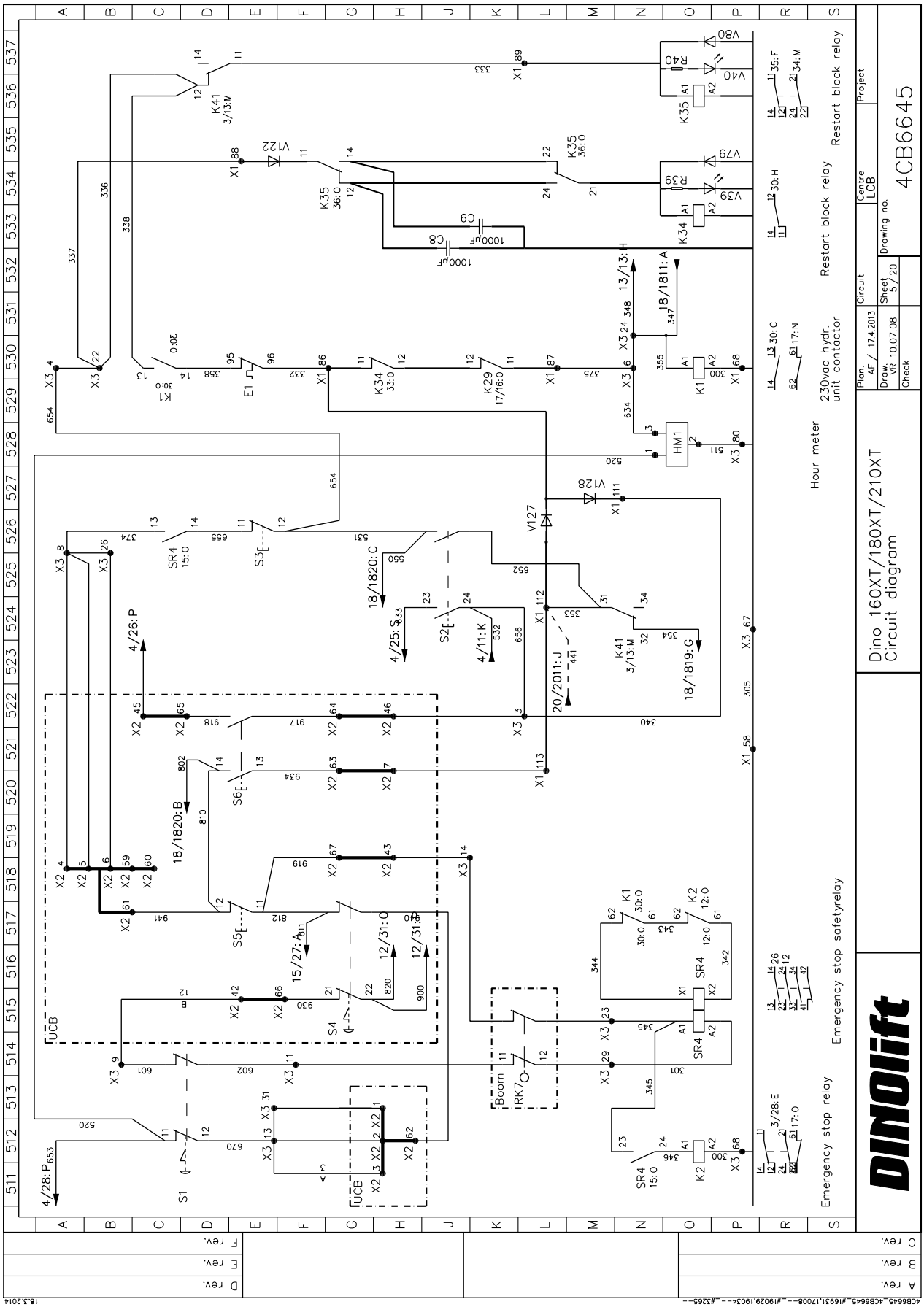
26 ELECTRIC DIAGRAM

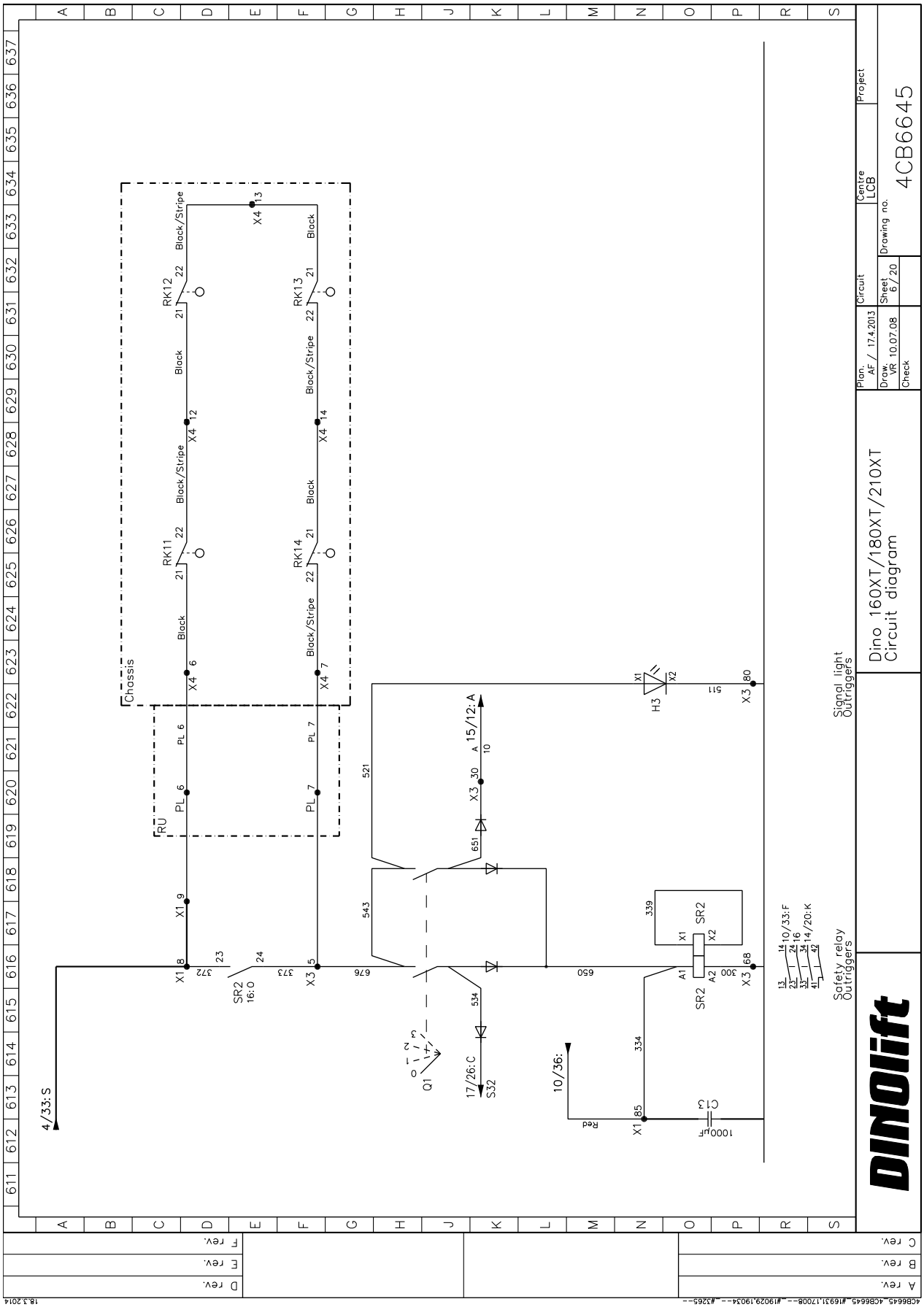


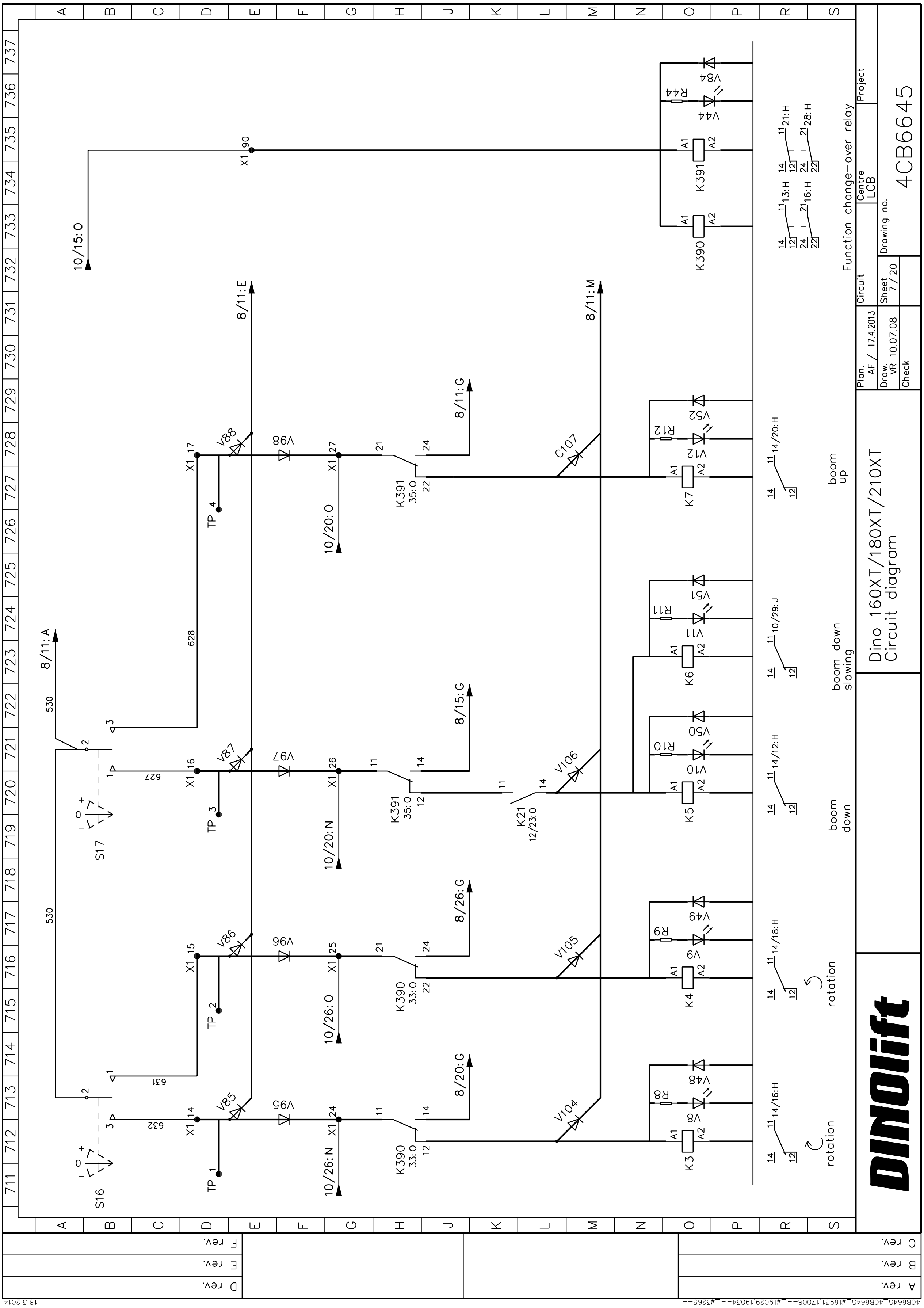


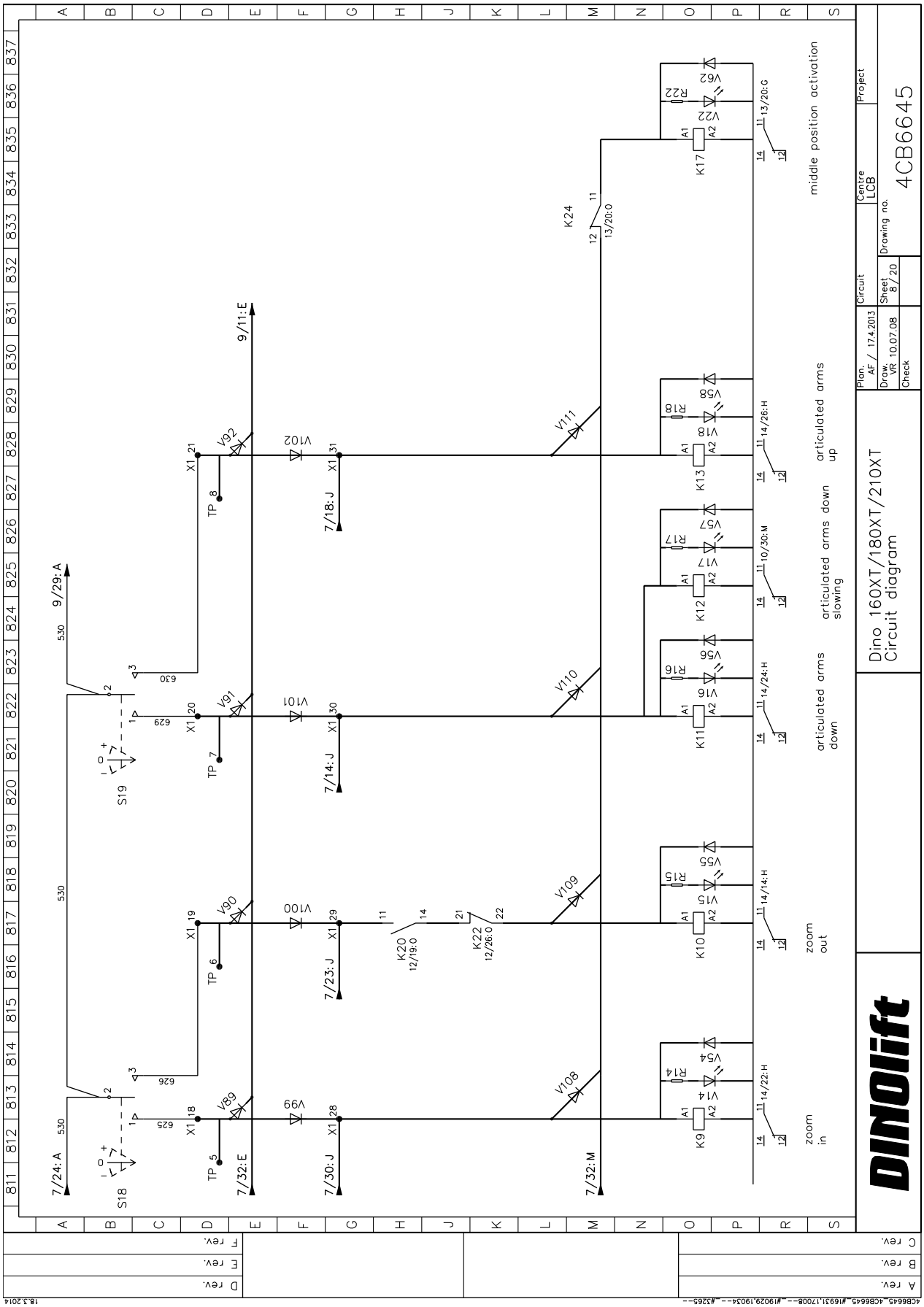


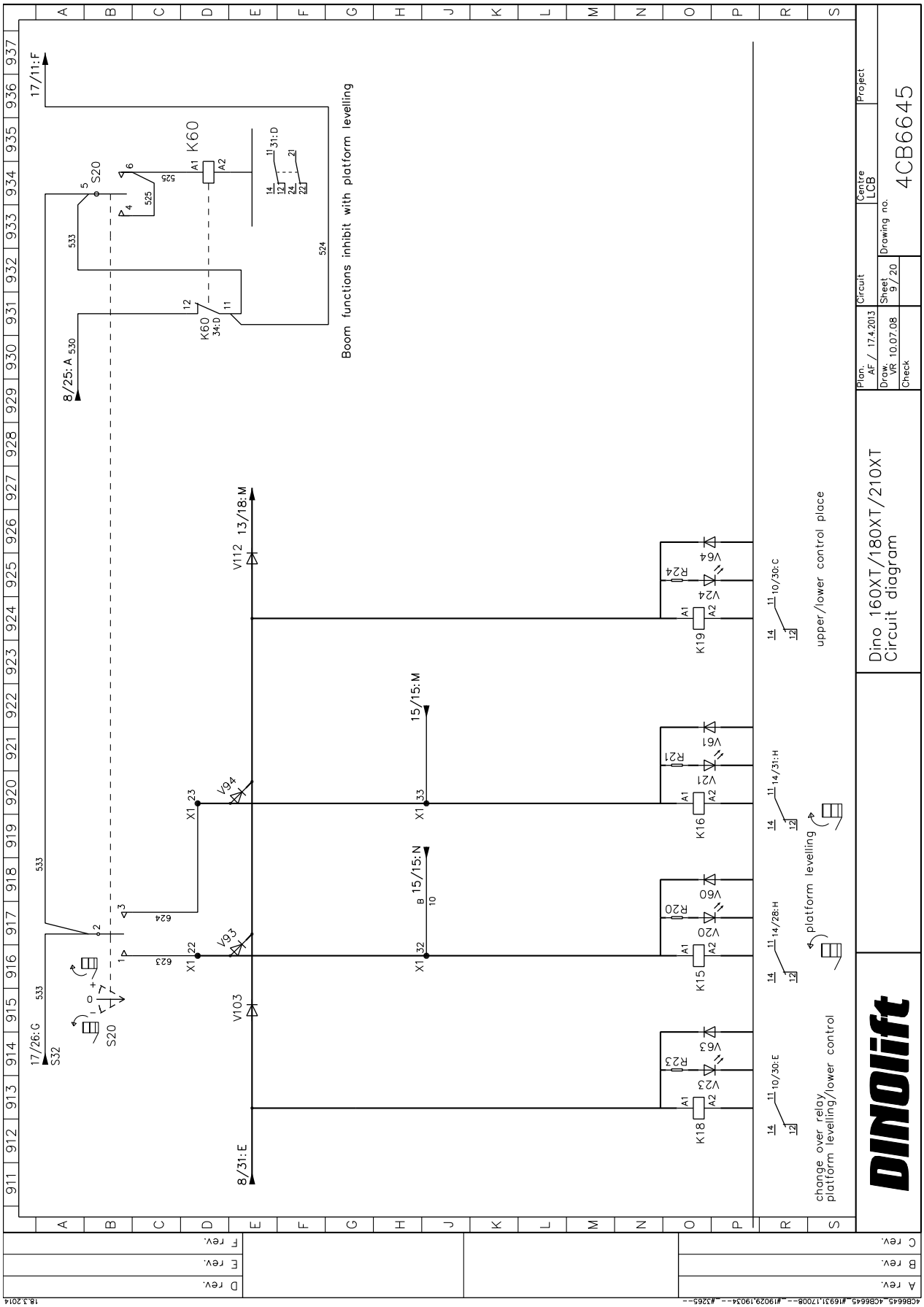

FUSES
F1=Power on LCB
F2=Start LCB
F3=Chassis LCB
F4=Controllers LCB
F5=Control card LCB
F6=Valves
F7=Emergency circuit
F8=Hatz/Honda
F9=Joystick UCB
F10=Platform rotation
F11= Battery main fuse
Dino 160XT/180XT/210XT
Circuit diagram
Drawing no.
4CB6645
Sheet 4/20
Centre LCB
Plan. AF / 17.4.2013
Draw. VR 10.07.08
Fuse 16Amp. (6,3x32mm)
TC - Timercard layout
Timer
RL1
RL2
F12
3/31:L (Ground)
5/23:K532 (Wake up+Hold circ.)
3/31:K Red 4mm2 (Batt. +12vdc)
14/27:A
17/11:A
17/31:G
6/12:A
16/16:A
5/11:A
12/12:A
12/33:D
5/23:C
5/23:H
331/1131:C
K27 14/36:N
Q1
F1 1,6A
F2 10A
F3 10A
F4 5A
F5 5A
F7 10A

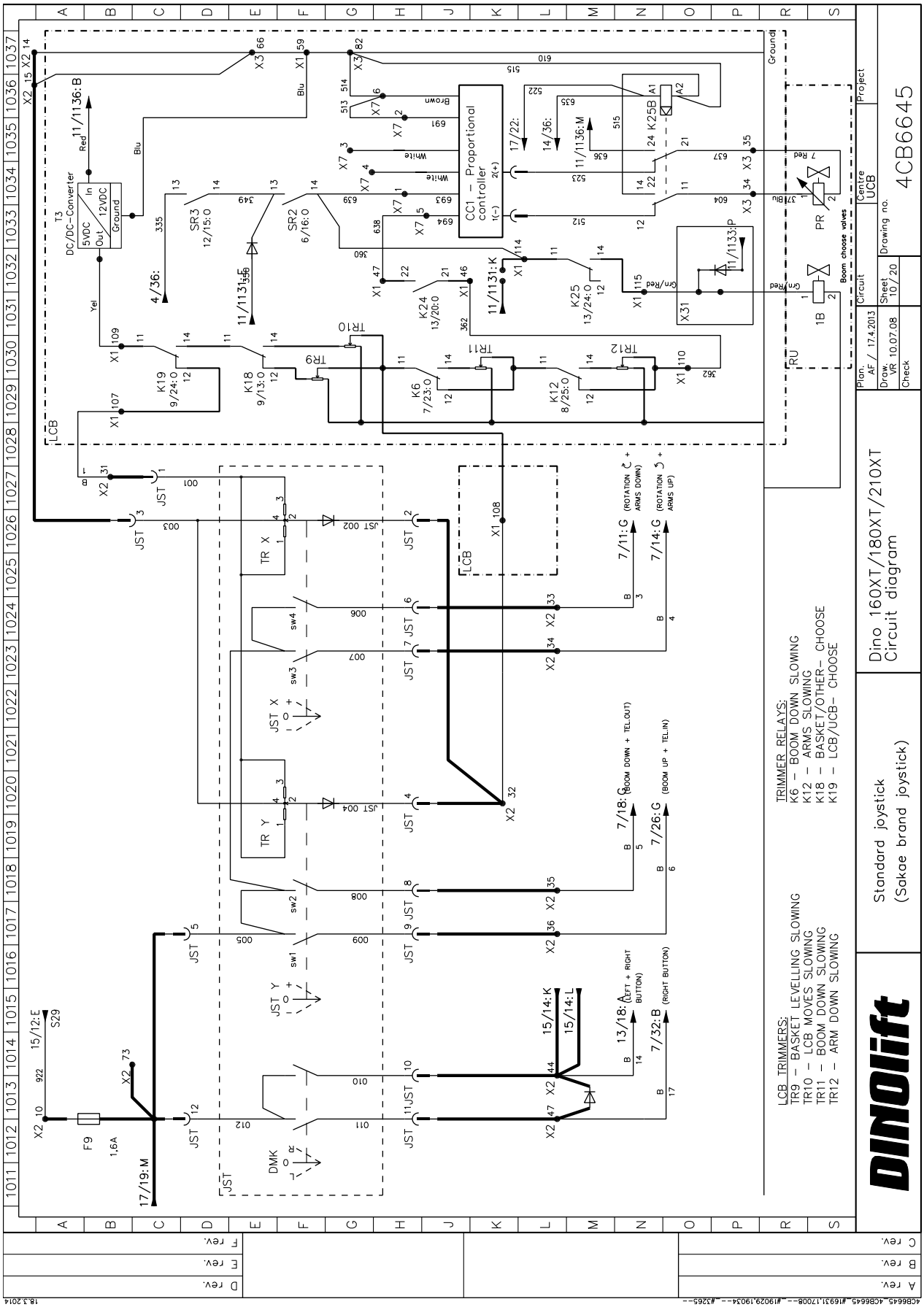


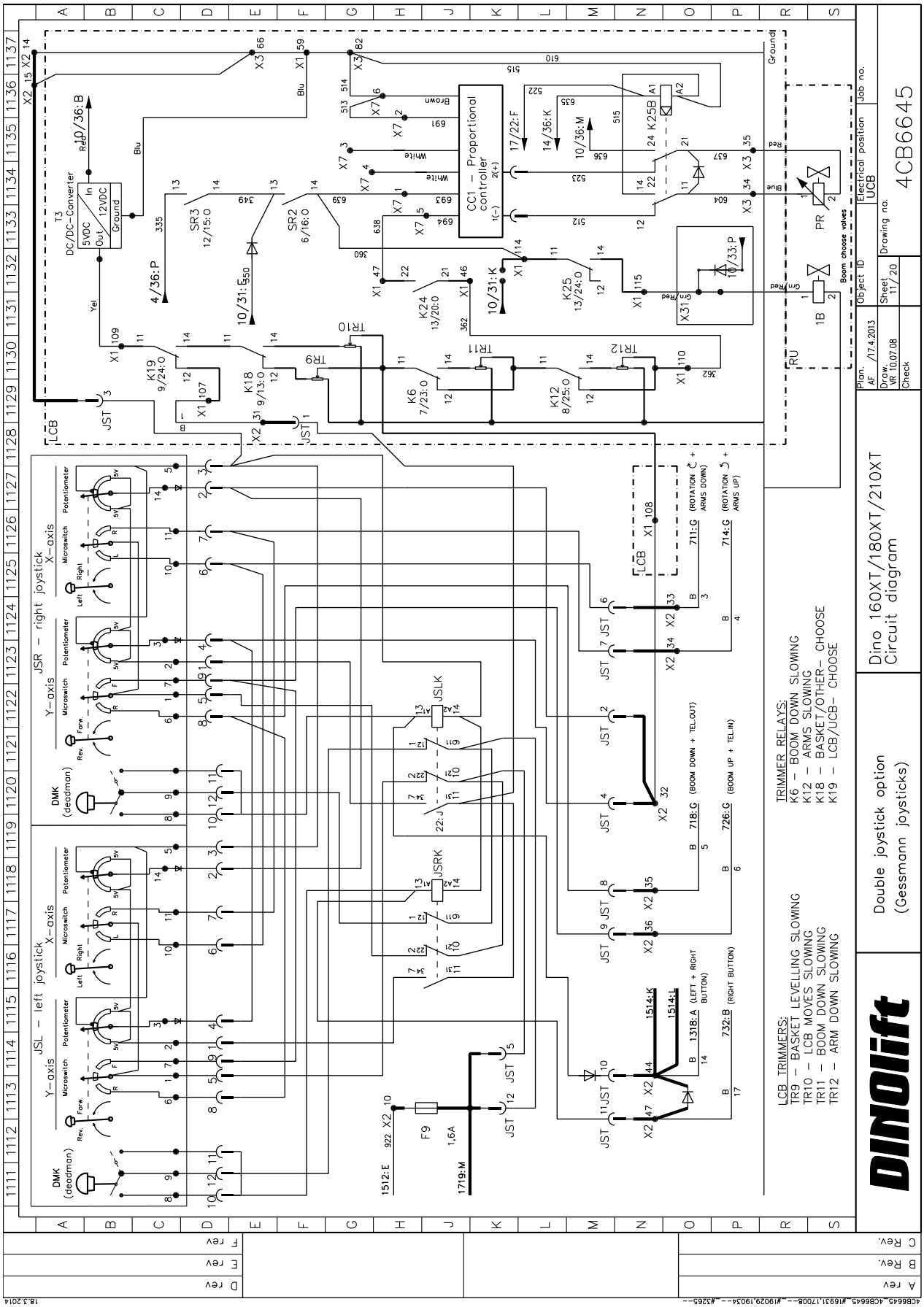

Chassis
RU
RK11
RK12
RK13
RK14
Black
Black/Stripe
PL 6
PL 7
SR2
Q1
S32
H3
C13
1000µF
Red
4/33: S
17/26: C
10/36:
15/12: A
10/33: F
14/20: K
Signal light
Outriggers
Safety relay
Outriggers
Dino 160XT/180XT/210XT
Circuit diagram
Plan. AF / 17.4.2013
Draw. VR 10.07.08
Check
Circuit
Sheet 6/20
Drawing no. 4CB6645
Centre LCB
Project
DINOlift
A rev.
B rev.
C rev.
D rev.
E rev.
F rev.

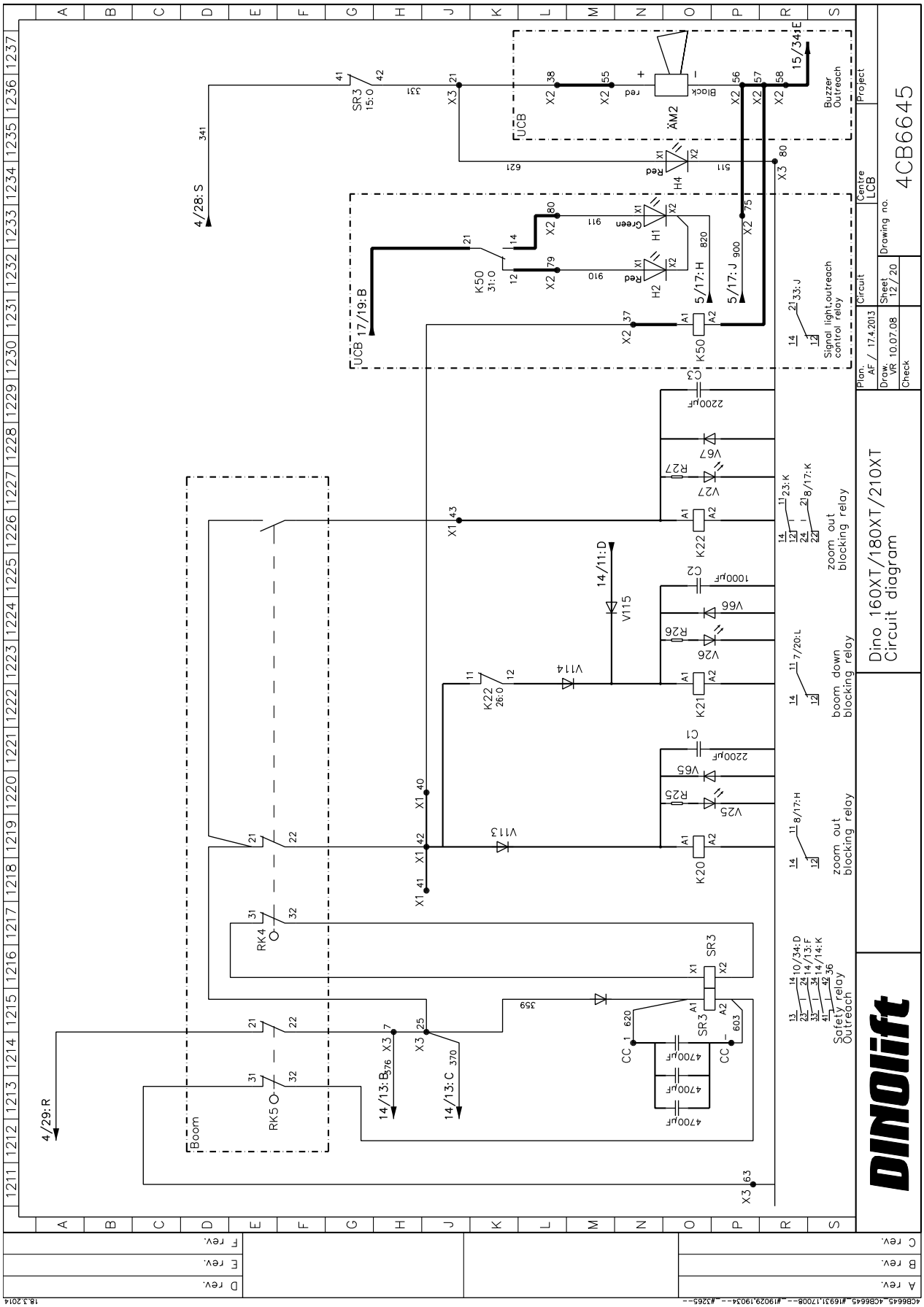

Function change-over relay
boom up
boom down slowing
boom down
rotation
rotation
Dino 160XT/180XT/210XT
Circuit diagram
Centre LCB
Drawing no.
4CB6645
Sheet 7/20
Plan. AF / 17.4.2013
Draw. VR 10.07.08
Check
Project
Circuit
DINOlift

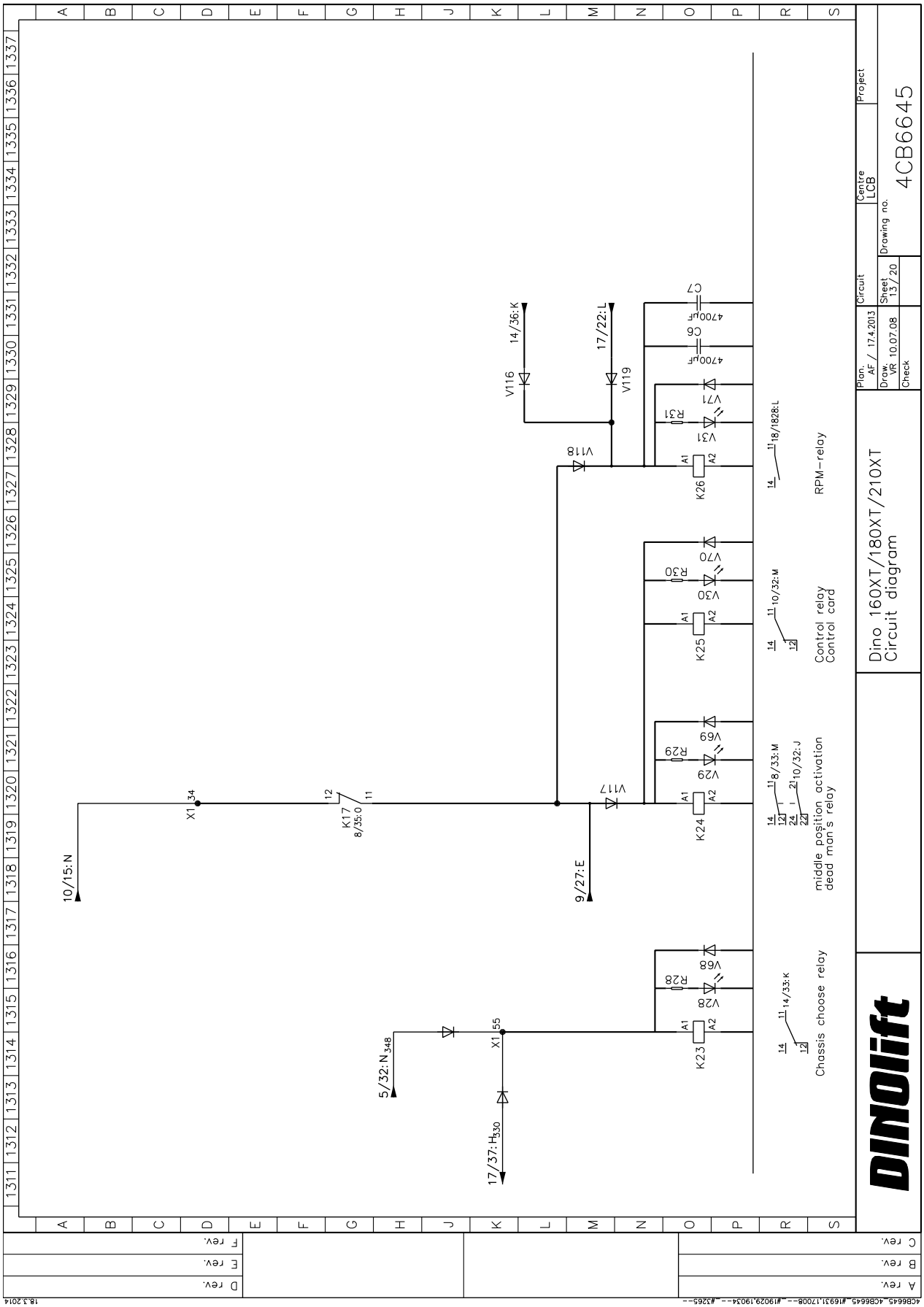

Dino 160XT/180XT/210XT
Circuit diagram
4CB6645
DINOlift
articulated arms up
articulated arms down slowing
articulated arms down
zoom out
zoom in
middle position activation

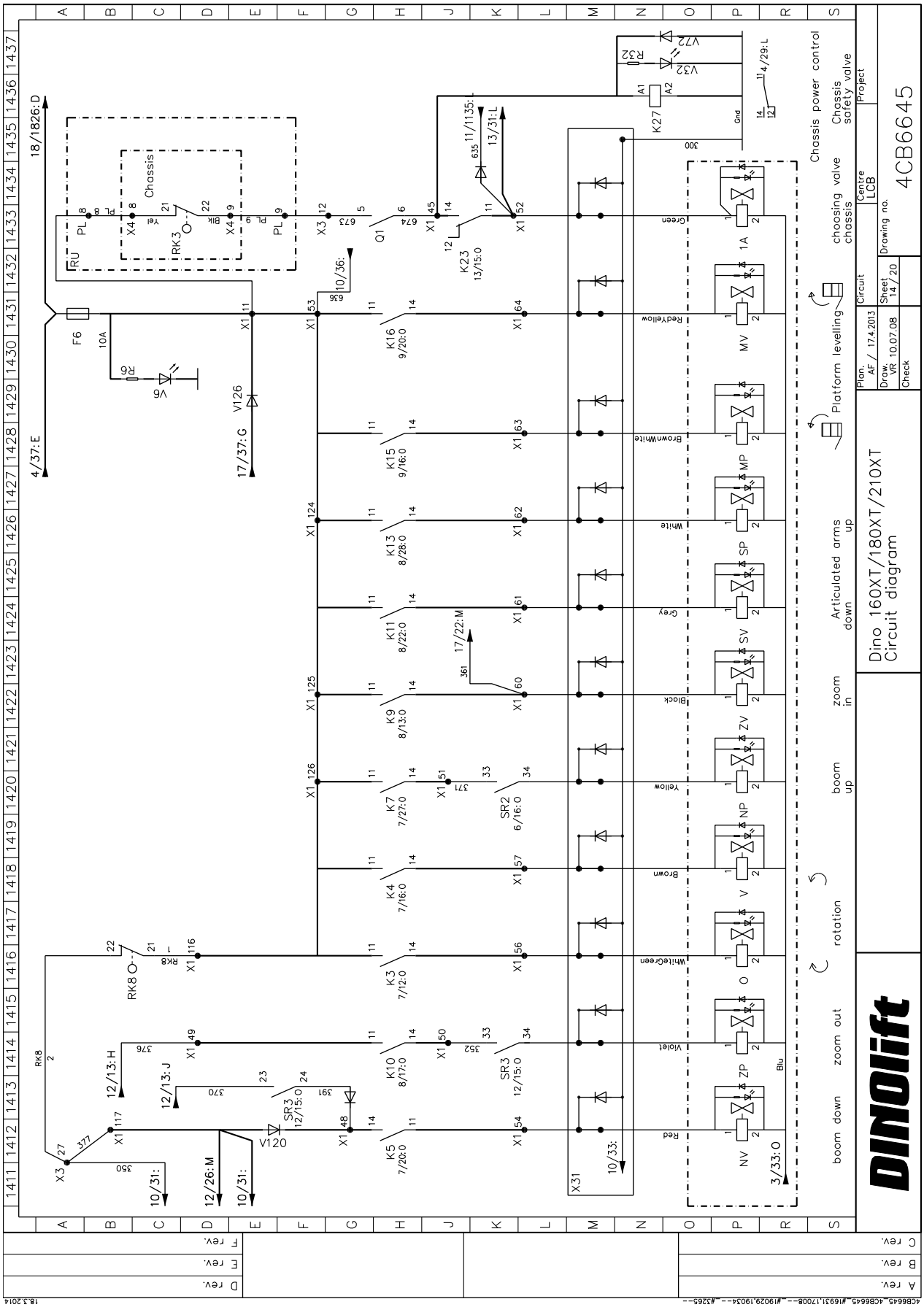


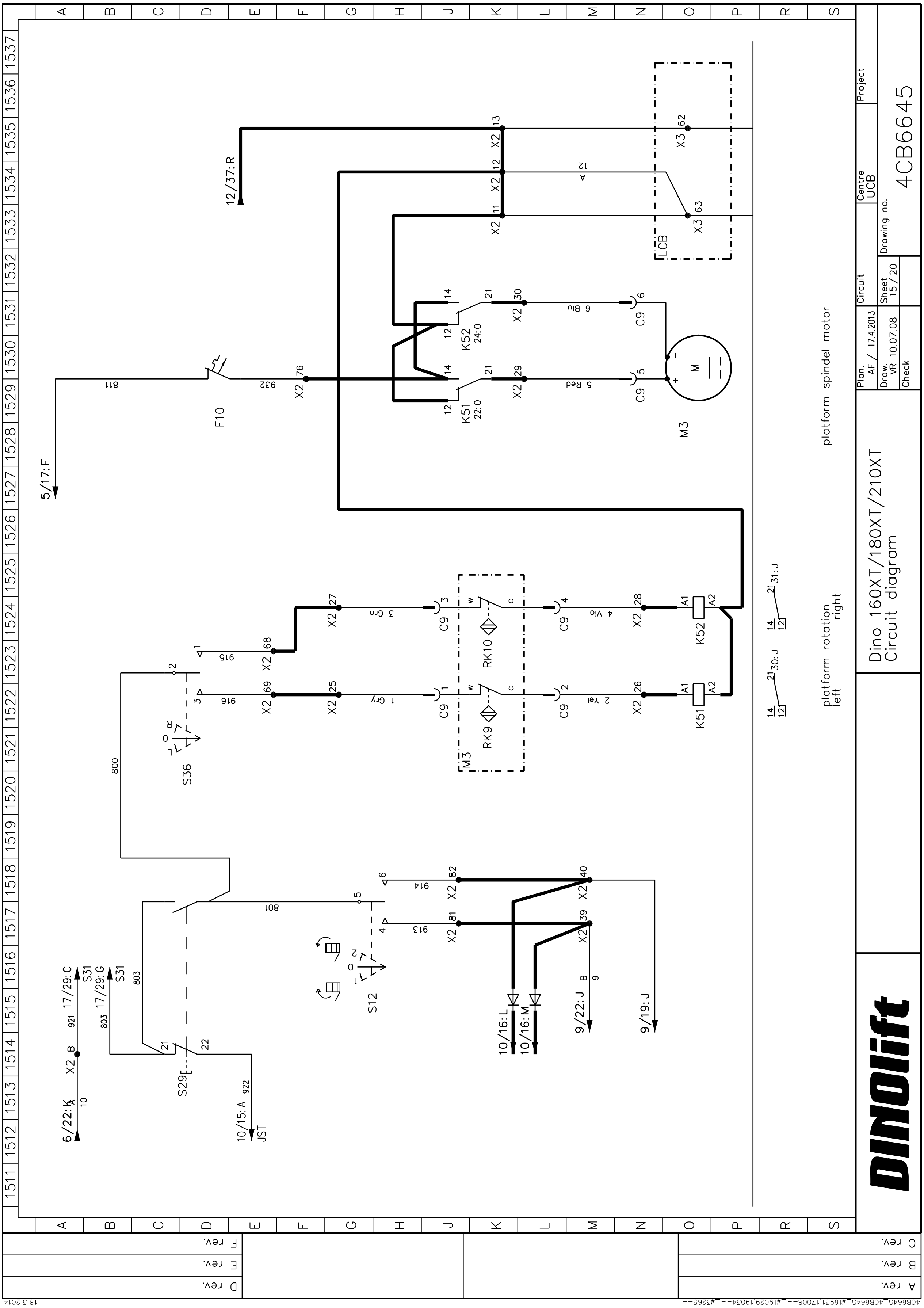

Dino 160XT/180XT/210XT
Circuit diagram
Standard joystick
(Sakae brand joystick)
4CB6645
LCB TRIMMERS:
TR9 – BASKET LEVELLING SLOWING
TR10 – LCB MOVES SLOWING
TR11 – BOOM DOWN SLOWING
TR12 – ARM DOWN SLOWING
TRIMMER RELAYS:
K6 – BOOM DOWN SLOWING
K12 – ARMS SLOWING
K18 – BASKET/OTHER– CHOOSE
K19 – LCB/UCB– CHOOSE
CC1 – Proportional controller
T3 DC/DC–Converter
SR3 12/15:0
SR2 6/16:0
K24 13/20:0
K25 13/24:0
K6 7/23:0
K12 8/25:0
K18 9/13:0
K19 9/24:0
K25B
PR
F9 1,6A
S29
DMK
JST X
JST Y
TR X
TR Y
sw1
sw2
sw3
sw4
LCB
RU
Boom choose valves
Ground
Project
Centre UCB
Drawing no.
Circuit
Sheet 10/20
Plan. AF / 17.4.2013
Draw. VR 10.07.08
Check
A rev.
B rev.
C rev.
D rev.
E rev.
F rev.



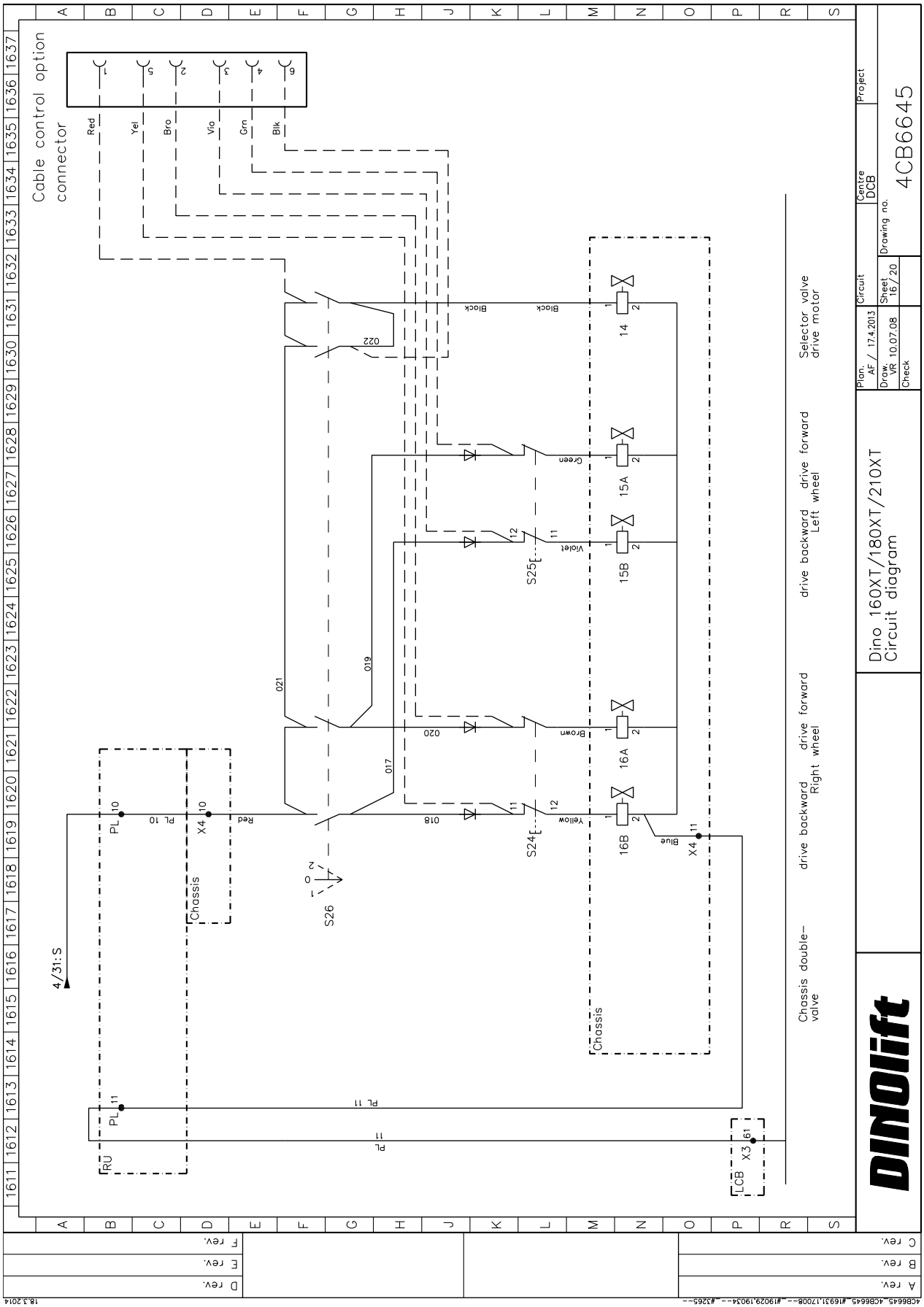


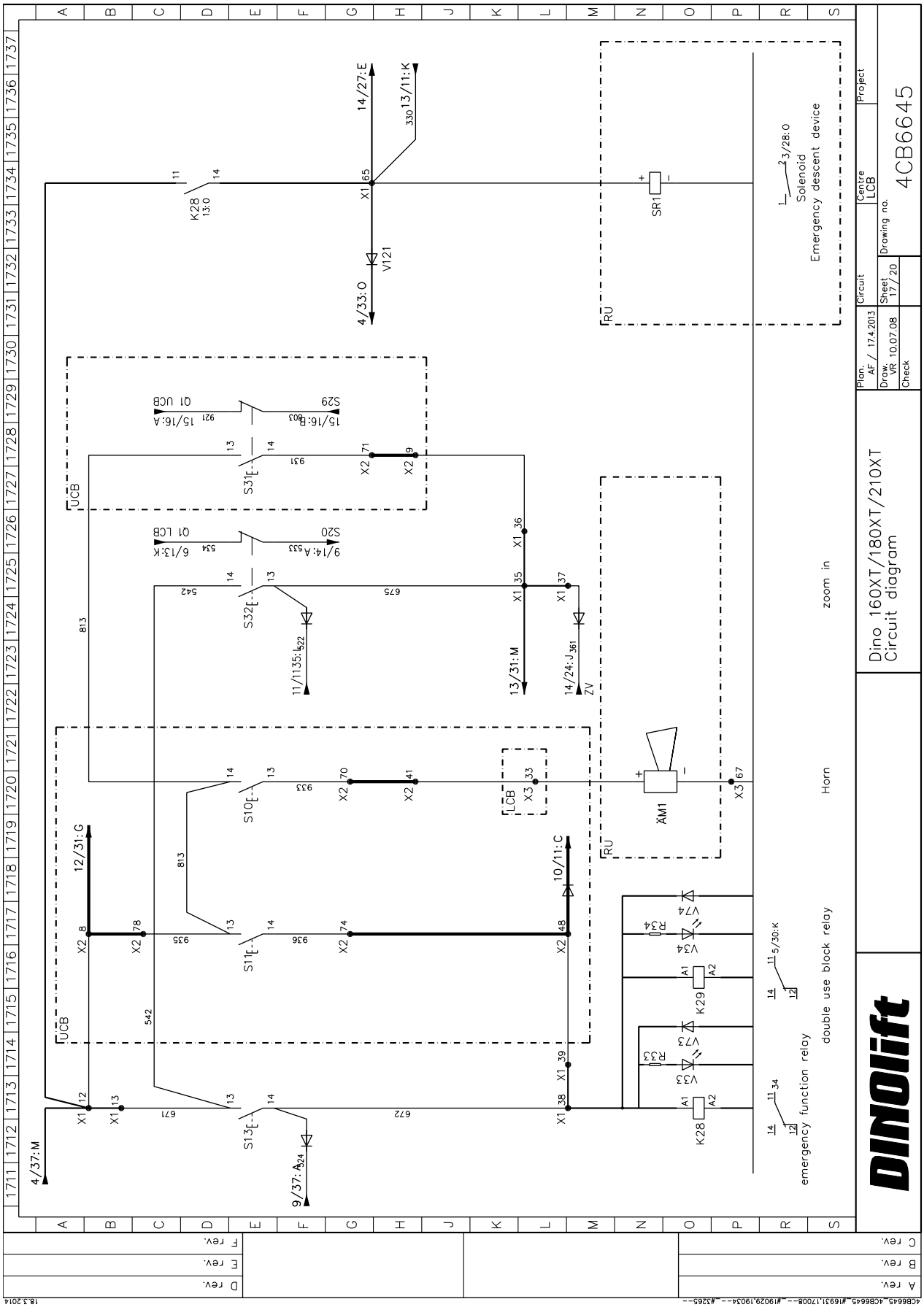


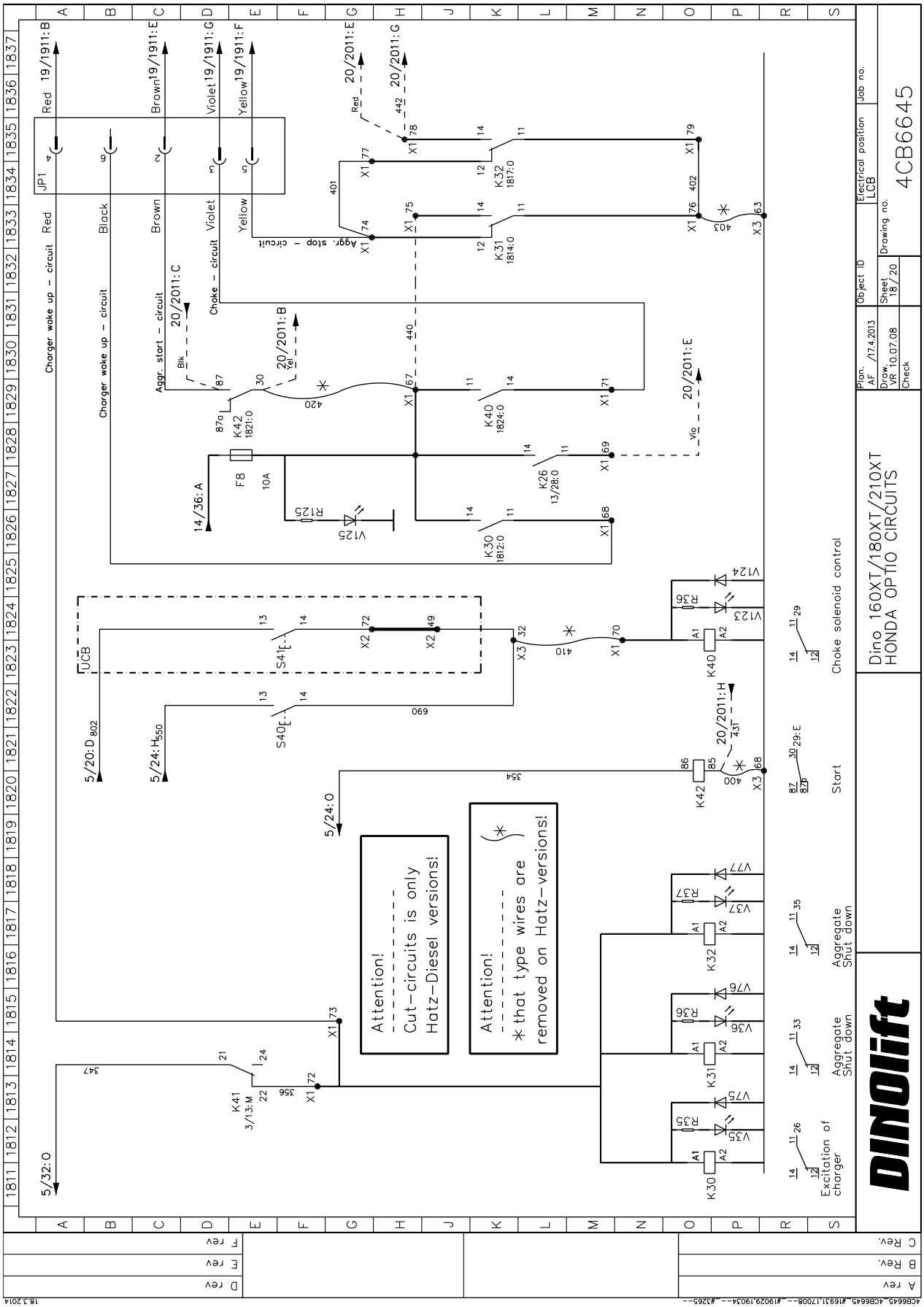


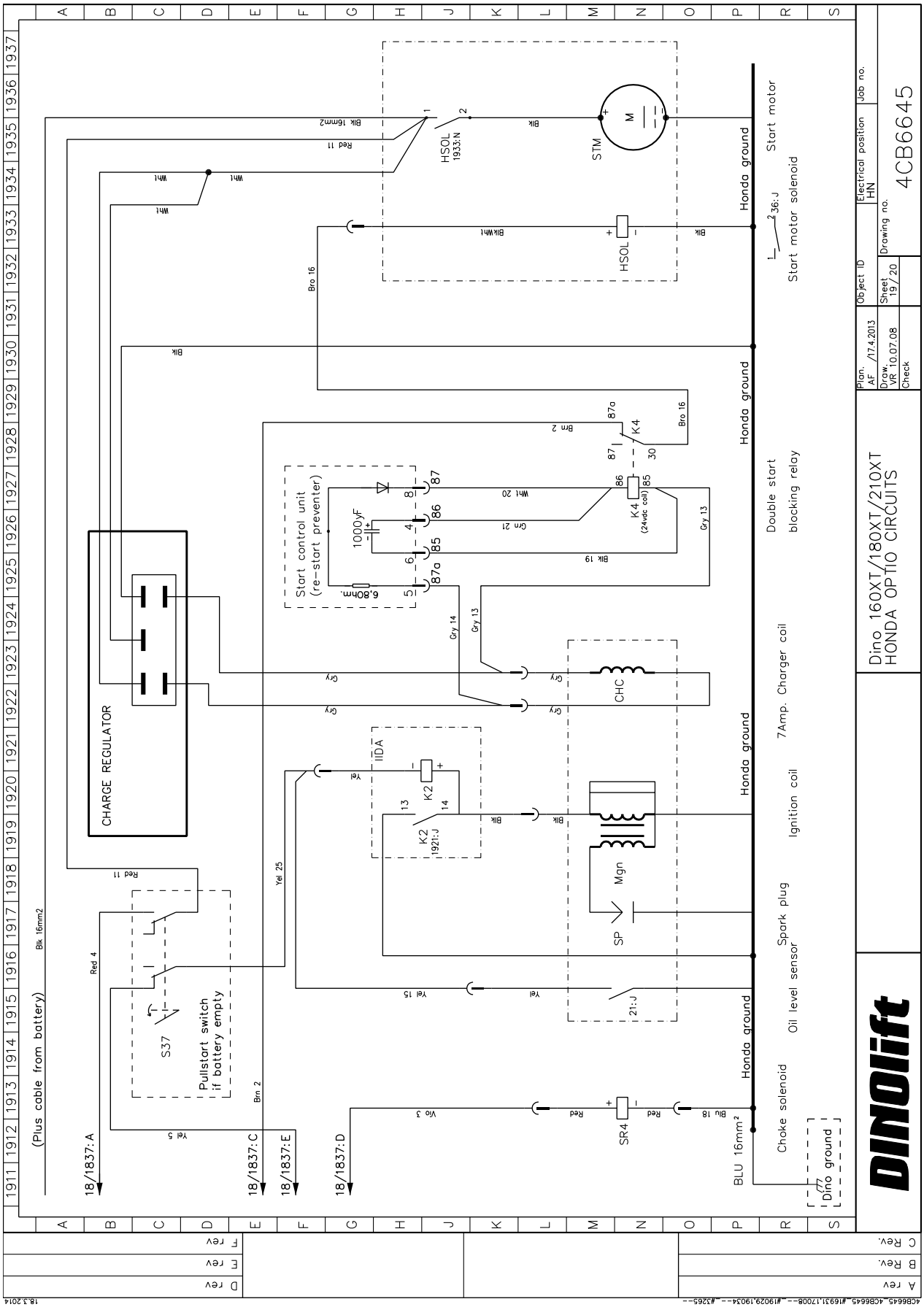


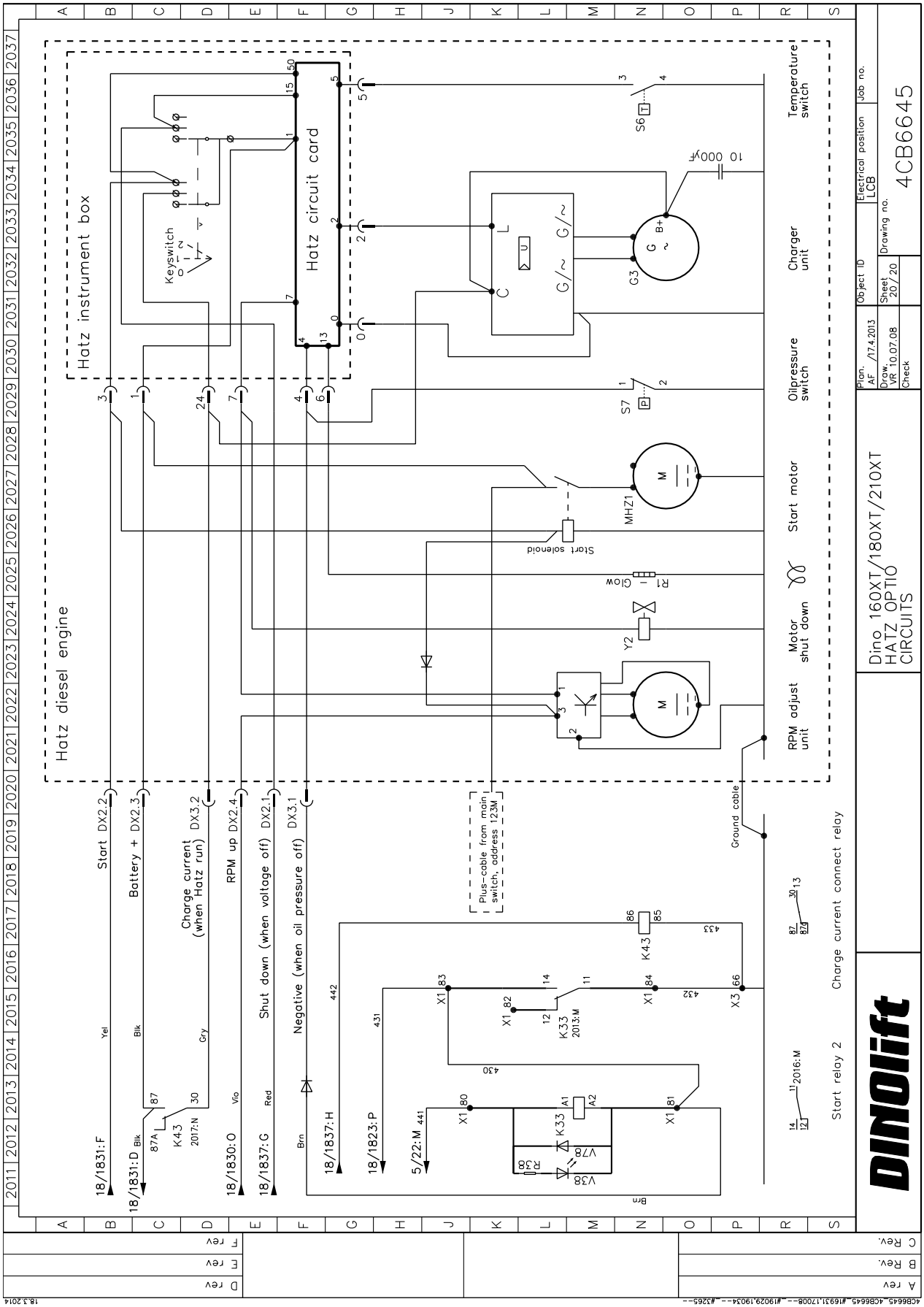
Dino 160XT/180XT/210XT
Circuit diagram
4CB6645
Drawing no.
Project
Centre UCB
Circuit
Sheet 15/20
Plan. AF / 17.4.2013
Draw. VR 10.07.08
Check
platform spindel motor
platform rotation right
platform rotation left
M3
K51
K52
F10
S36
S29
S12
S31
LCB
RK9
RK10





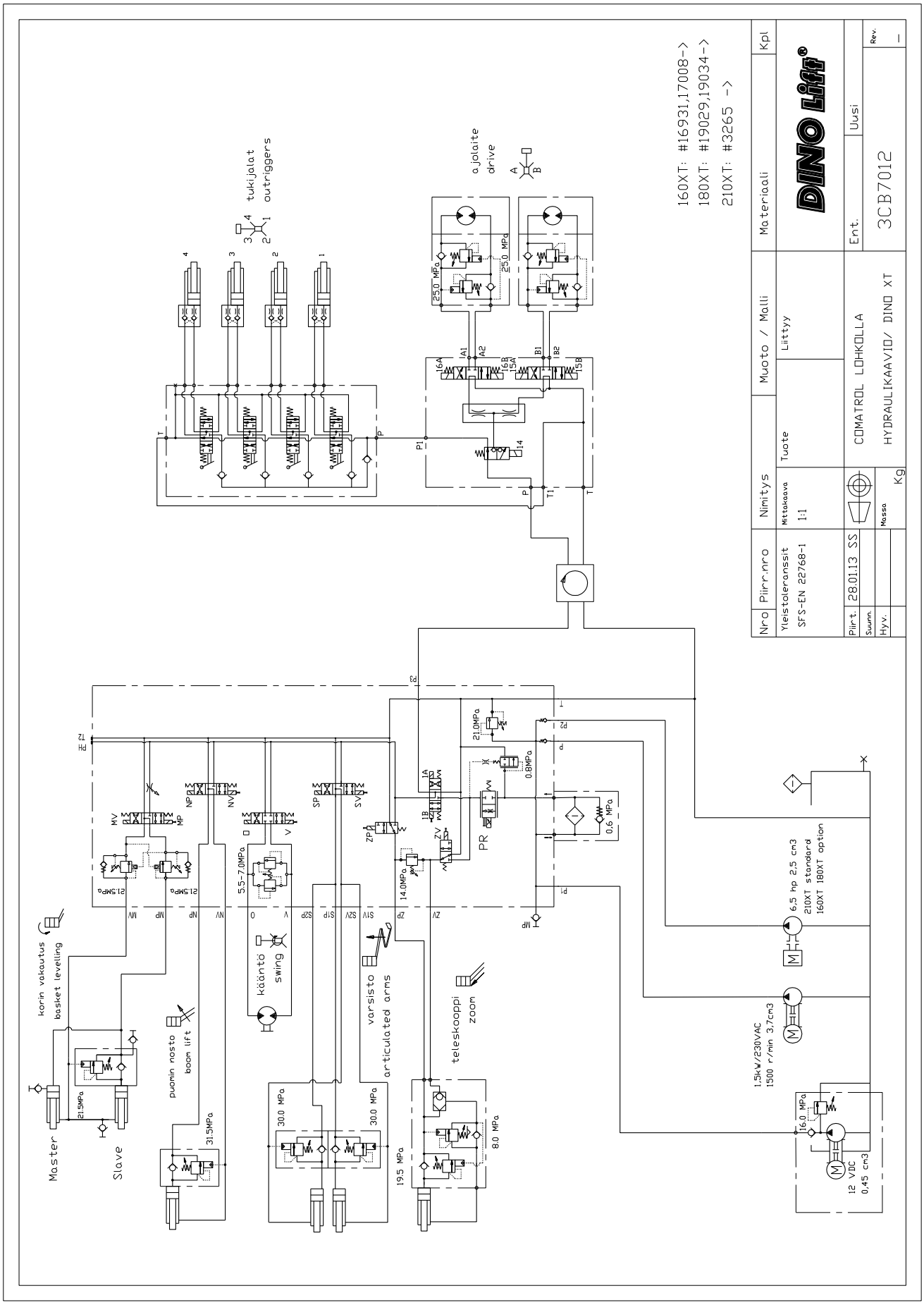




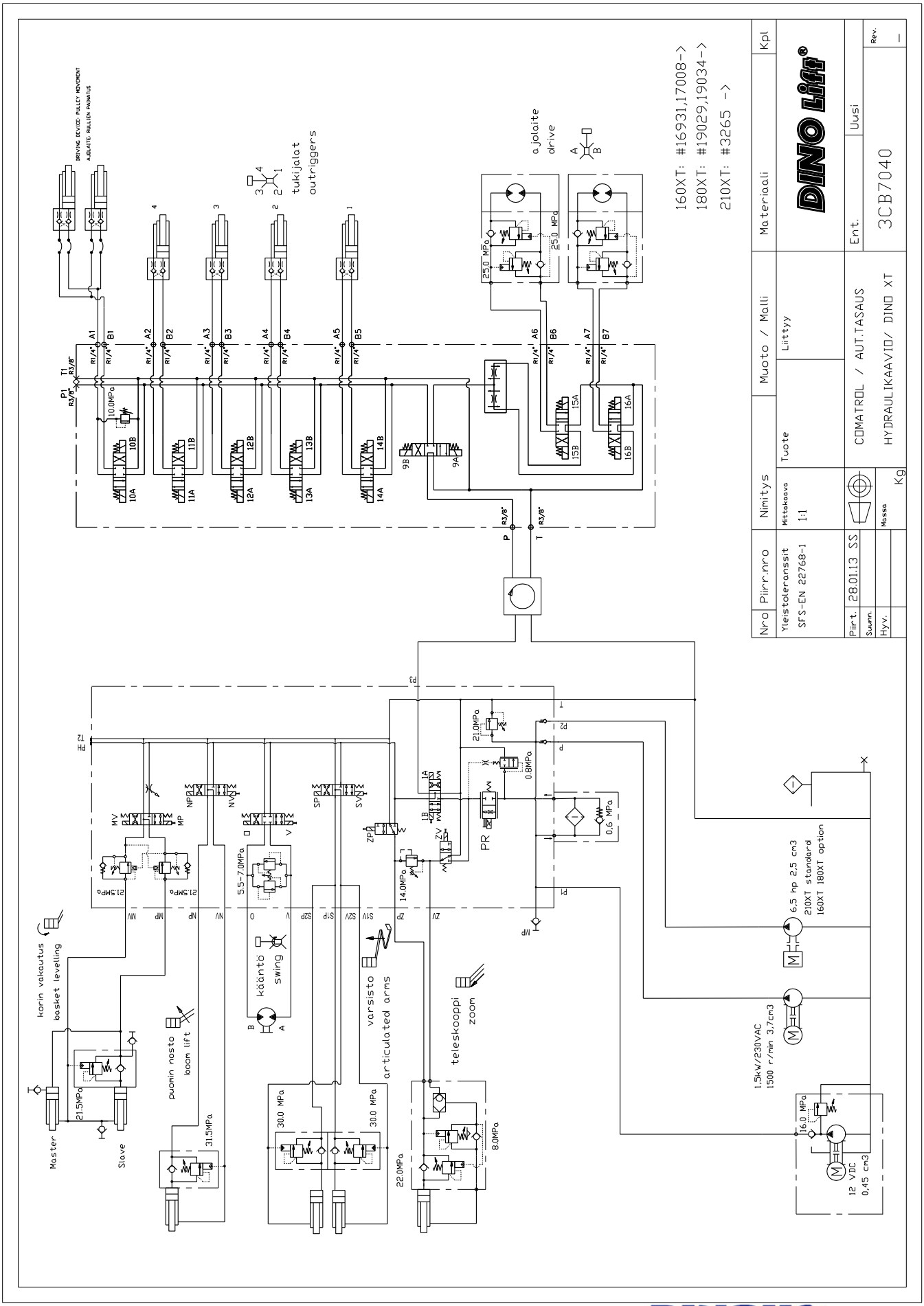


27 HYDRAULIC DIAGRAM

27.1 Standard machine



27.2 Automatic levelling (option)



Notes

27.2.1 Sample of inspection protocol for the access platform

DINOlift

www.dinolift.com

TEST CERTIFICATE

DATE:

START-UP TESTS:

Inspection place: **Dinolift Oy**

Inspector's signature: Hämäläinen Pekka NT0152-2

BASIC KNOWLEDGE

Manufacturer:	**Dinolift OY**	Place of manufacture:	**Finland**
Address:	**Raikkolantie 145**		
	32210 LOIMAA		
Importer:			

Type of lift:	☑ Boom platform	☐ Scissor platform	☐ Mast platform
Chassis:	☐ Car	☐ Self propelled	☑ Trailer mounted
Boom:	☐ Articulated boom	☐ Telescope boom	☑ Articulated telescope boom
	☐ Scissor	☐ Fixed mast	☐ Telescope mast
Outriggers:	☑ Hydraulic turning	☐ Hydraulic pushing	☐ Mechanical

TECHNICAL SPECIFICATIONS

Machine and type:	**DINO 160XT**	Max. platform height	**14 m**
Number of manufacture	**YGCD160XT E00170**	Max. outreach: depend on load:	**Depend on load**
Year of manufacture	**2014**		
Max. lifting capacity:	**215 kg**	Boom rotation:	**Continuous**
Max. person number:	**2**	Support width:	**3,8 m**
Max. additional load:	**55 kg**	Transport width:	**1,80 m**
Power supply:	**230VAC**	Transport length:	**5,99 m**
Lowest temperature:	**-20 °C**	Transport height:	**2,29 m**
Weight:	**2070 kg**	Basket size:	**0,7 x 1,3 m**

Inspection points: (Y = meet standards N = do not meet standards)

	Y	N		Y	N
A. STRENGTH			6. Plate for supports	☑	☐
1. Certificate of material	☑	☐	7. Safety colours	☑	☐
2. Certificate of strength	☑	☐			
			D. SAFETY REQUIREMENTS		
B. STABILITY			1. Indicating device for horizontal position	☑	☐
1. Certificate of stability test	☑	☐			
2. Working space diagram	☑	☐	2. Locking device and lockings	☑	☐
			3. Stop device for lifting	☑	☐
C. GENERAL REQUIREMENTS			4. Stop for opening of support	☑	☐
1. User's manual	☑	☐	5. Safety distances	☑	☐
2. Place for safekeeping for user's manual	☑	☐	6. Position of working face	☑	☐
3. Machine plate - checking plate	☑	☐	7. Structure of working face	☑	☐
4. Load plate	☑	☐	8. Emergency descent system	☑	☐
5. Warning plate	☑	☐	9. Limit devices	☑	☐

E. ELECTRIC APPLIANCES		G. SAFETY DEVICE	
1. Electric appliances	☑ ☐	1. Safety limit switch	☑ ☐
		2. Sound signal	☑ ☐
F. CONTROL DEVICES			
1. Protections	☑ ☐	H. LOADING TEST	
2. Symbols / directions	☑ ☐	1 .Dynamic = 237 kg	☑ ☐
3. Placings	☑ ☐	2. Static = 323 kg	☑ ☐
4. Emergency stop	☑ ☐	3. Work movements	☑ ☐
	☑ ☐		

FAILINGS AND NOTES

Failings have been repaired. Date: _____ Signature: _____

Dinolift Oy
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FIN-32210 LOIMAA, FINLAND
Tel. +358 - 20 - 1772 400, Fax +358 - 2 - 7627 160, e-mail: info@dinolift.com