LIEBHERR

TELESCOPIC BOOM MOBILE CRANE

LTM 1500-8.1

LTM 1500-8-1-006

Part 1 + Part 2

Operating instructions

BAL-No. **11824-05-02**

Part 1 pages : 1 up to 886

Crane number	
Date	

The operating instructions are part of the crane !

Always keep on hand !

Comply with road travel and crane operating regulations !

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CONTENTS

2.8 Telescopic boom 84 m * (T)

20 Pivot section

21 Telescoping section 1

22 Telescoping section 2

30 Telescoping section 3

31 Telescoping section 4

32 Telescoping section 5

33 Telescoping section 6

2.9 Fixed lattice jib with guying and eccentric (TY3EF)

85 Eccentric

*Optional

4. Support forces

Max. support force per support	front	rear
with nominal load	1760 kN	2060 kN

5. Workplace related emission values

Noise level at nominal engine RPM	Stationary noise level L_{pAeq} [db(A)]	
	left ear	right ear
Driver's cab, driver's side	75	72
Driver's cab, passenger side	73	
Crane operator's cab	75	

Pos.:

17	Display / indicator unit	
18	Keypad unit	- In case of selected and completed function, the function indicator on the corresponding button lights up. - In case of selected, but not completed function, the function indicator on the corresponding button blinks. - In case of **non-permissible** function , an acoustical signal (beep) can be heard when the button is pressed.
19	Arm. center console	
20	Switch, button	- Switch : Change over outside mirror right / left Button: electric mirror adjustment
23	Ignition starter switch	- Position: P / 0 / I / II
24 - 25	not used	
26 *	Switch	- Battery charge unit, change over superstructure (OW) / chassis (UW)
27 *	Switch	- Dolly operation
28 - 30	not used	
31 *	Switch	- Camera cleaning
32	Hour meter	
33	Integrated electrical socket 24 V	
34	Cigarette lighter	
36	Axle pressure gauge	- 1. + 2. axle, left side 1. to 4. axle, left side for axle pressure compensation axle 1 to 4
37	Axle pressure gauge	- 1. + 2. axle, right side 1. to 4. axle, right side for axle pressure compensation axle 1 to 4
38	Axle pressure gauge	- 7. + 8. axle, left side 5. to 8. axle, left side for axle pressure compensation axle 5 to 8
39	Axle pressure gauge	- 7. + 8. axle, right side 5. to 8. axle, right side for axle pressure compensation axle 5 to 8
41	Ashtray	
42	Reservoir	- Windshield cleaning fluid
43	Interior light	
44	Vents	- for heater / ventilation / air conditioning system *
45	Switch	- Window lift, left
46	Switch	- Window lift, right
47	Switch	- Window lift, right
48	Trip logger	

* Optional

3. INDICATOR UNIT

Pos.:

180	*	Indicator light	- Auxiliary heater ON **blinks:** in case of a problem
181		not used	
182		Warning light	- Engine coolant level too low
183		Indicator light	- Air filter contaminated
184		Indicator light	- Preglow Diesel engine
185		Warning light	- Steering circuit I (steering pump)
186		Warning light	- Steering circuit II (auxiliary steering pump)
187		Warning light	- Speed limitation **lights up:** If factory adjusted top speed is exceeded. **blinks:** In case of a problem with the speed signal from the tachograph.
188		Indicator light	Torque converter clutch open **illuminates:** torque converter clutch open **off:** torque converter clutch closed **flashes:** CAN bus link problem or oil temperature too high
189		Warning light	- Gear off, problem communication travel switch ⇔ gear
190		not used	
191	*	Indicator light	- automatic brake force reduction
192	*	Indicator light	- Release for Dolly operation **blinks**: If the hydraulic pressure for release of slewing brake / luffing cylinders lowering brake drops below 40 bar when driving with dolly* and turned on switch (27).
193		not used	
194	*	Warning light	- Boom **not** placed in receptacle bracket
195		Indicator light	- High beam
196		Indicator light	- Low beam
197		Indicator light	- Rear fog light
198		Indicator light	- Beacon, left front
199	*	Indicator light	- Beacon, right front
200		Indicator light	- Engine brake active **lights up**: Engine brake active **blinks**: selected but not actuated
201		Indicator light	- Parking brake applied
202	*	Indicator light	- Eddy current brake active
203		not used	
204	*	Indicator light	- Brake pad wear
205		not used	
206		not used	

* Optional

1.6 Check the lights

The lights can only be checked if the battery master switch and the ignition are turned on.

All lights must be checked before starting to travel:

- Low beam (1)
- High beam (2)
- Parking light, front and rear (3)
- Fog light (4) *
- Blinker (5)
- Tail light (6)
- Brake lights (7)
- Back up light (8)
- Beacons (9)
- Overhang lighting (10)
- Red reflector (11)
- License plate illumination (12)
- Side running lights (13)
- Track light (14)
- Contour light (15)
- Rear fog light (16) *

D A N G E R: **Missing and defective lights increase the chances of having an accident! Defective lights must be repaired by expert personnel before driving the crane.**

* Optional

2. Controls and instruments

Note: All functions of axle suspension or axle locking system can be made only via the **"2-Hand button"**, for safety technical reasons. This means the confirmation button **(143)** must always be actuated together with the function keys.

Pos.:

31	Axle pressure gauge	- 1.+2. axle, left side 1. to 4. axle, left side with axle pressure compensation axle 1 to 4
32	Axle pressure gauge	- 1.+2. axle, right side 1. to 4. axle, right side with axle pressure compensation axle 1to 4
33	Axle pressure gauge	- 7.+8. axle, left side 5. to 8. axle, left side with axle pressure compensation axle 5 to 8
34	Axle pressure gauge	- 7.+8. axle, right side 5. to 8. axle, right side with axle pressure compensation axle 5 to 8
112	2-Hand button	- Vehicle incline position: left front up (fill left front)
113	2-Hand button	- Vehicle incline position: right front up (fill right front)
119	2-Hand button	- Vehicle incline position: left front down (lower left front)
120	2-Hand button	- Vehicle incline position: right front down (lower right front)
127	2-Hand button	- Vehicle incline position: left rear up (fill left rear)
128	2-Hand button	- Vehicle incline position: right rear up (fill right rear)
135	2-Hand button	- Vehicle incline position: left rear down (lower left rear)
136	2-Hand button	- Vehicle incline position: right rear down (lower right rear)
129	2-Hand button	- Automatic leveling regulation If this button is pressed (function indicator lights up) then the crane aligns itself automatically via the hydraulic cylinders to the correct height for on road travel. (Function indicator on the button blinks when the correct level for on road travel is reached.)
130	2-Hand button	- Axle suspension locked / suspended (Function indicator lights up when the axle suspension is locked)
131 *	2-Hand button	- Raise 5th and 6th axle (independent rear axle steering)
132 *	2-Hand button	- Lower 5th and 6th axle (independent rear axle steering)
142	2-Hand button	- Axle pressure compensation

- If function is selected and carried out, the function indicator on the corresponding button lights up.
- If function is selected, but not carried out, the function indicator on the corresponding button blinks.
- In case of a function, which is **not permitted**, an acoustical signal (beeping sound) can be heard when the button is pressed.
- If the function check blinks rapidly, then this means an error is present.

* Optional

1.1 Travel conditions of the crane with axle loads ≤ 12 t

Before driving the crane on public roads and highways, to keep an axle load of **12 t** per axle, the travel condition of the crane according to illustrations and charts conforming to **StVZO** regulation must be established.

C A U T I O N : In other countries, all **LOCAL, NATIONAL AND REGIONAL REGULATIONS** must be observed!

Prerequisite:
The telescopic boom is secured to prevent it from running out by itself.
Adjust the axle suspension system to **"suspended"**.
The vehicle is in level position for on road travel.

T50	Fig. 1	Axles	
		1 - 4	5 - 8
with:	Telescopic boom Tires: 385/95 R 25		
without:	Counterweight Superstructure - fuel tank Support plates Hook block		
Axle loads: [t]	Total: **96.0**	**4 × 12**	**4 × 12**

T84	Fig. 2	Axles	
		1 - 4	5 - 8
with:	T1 + T2 + T3, (300 mm extended) Tires: 385/95 R 25		
without:	Counterweight Superstructure - fuel tank Support plates Hook block		
Axle loads: [t]	Total: **95.2**	**4 × 11.8**	**4 × 12**

1.2 Axle loads > 12 t

C A U T I O N : In other countries, all **LOCAL, NATIONAL AND REGIONAL REGULATIONS** must be observed!

D A N G E R : **Due to the higher total weight, the brake path is longer!**
Wear of brake pads and danger of brake overheating is increased.
Steering system, service brake, parking brake and continuous retarder brake no longer conform to the regulations!
The service life of all parts affected by the increased axle load, such as brakes, tires, rims, axles, as well as the complete drive, suspension and steering assemblies will be reduced.

3.3 Parking brake

3.3.1 Apply the parking brake

- Pull the manual brake lever (3) back until it engages, the indicator light (201) lights up.

D A N G E R : **It must be checked if the manual brake lever (3) has engaged properly. You should not be able to push the manual brake lever (3) forward (without pulling it out first). Otherwise there is a danger of accidents as the machine may roll off by itself.**

3.3.2 Release the parking brake

- Pull the manual lever (3) out all the way in lengthwise direction of the lever and push it forward. The indicator light (201) turns off.

C A U T I O N : **As long as the required brake release pressure (approx. 5.5 bar) is not available in the air pressure supply III – warning light (241) lights up – the parking brake is not released, even if the hand lever has been moved forward. In this case, move the hand lever back again and fill the air pressure supply III until the warning light (241) turns off.**

3.4 Service brake

Check the brake function after starting to drive with the brake pedal (1) .

C A U T I O N : **Check the brake function immediately after starting to drive.**

Note: The indicators on the bargraphs (242, 244) must move in proportion to the pedal stroke of the service brake.

3.5 Retarder brake

The retarder brake consists of the engine brake, the hydraulic Retarder and the Eddy current brake *. The retarder brake is actuated with the 6-stage steering column switch (7) . 5 switch positions are available.
When actuating the steering column switch, each shift position must be engaged momentarily, t prevent the wheels from blocking when the road is wet.
The switch should be pulled through stage by stage, not suddenly, to prevent possible overbraking.

C A U T I O N : **As soon as the vehicle is at a standstill and no delay is necessary, the retarder brake must be turned off by resetting the steering column switch to stage (0) to prevent overheating. The return shift can be made in one stroke, without breaks between the stages.**

*Optional

3.6.4.1 Gear selection with the steering column switch

With the steering column switch, one or serval gears can be shifted at the same time. The steering column switch returns to its initial position after every use.

Shift up

- Move the manual lever (7) up momentarily to shift up by one gear.
- By holding the manual lever (7) up, the gears can be increased in 1/2 second intervals.

Shift down

- Move the manual lever (7) down momentarily to shift down by one gear.
- By holding the manual lever (7) down, the gears can be decreased in 1/2 second intervals.

3.6.4.2 Gear selection with button

By shifting up with button (105) or down with button (108), one or more gears can be shifted at the same time.

Shift up

- Press the button (105) momentarily to shift up by one gear.
- By holding the button (105) down, the gears can be increased in 1/2 second intervals.

Shift down

- Press the button (108) momentarily to shift up by one gear.
- By holding the button (108) down, the gears can be decreased in 1/2 second intervals.

3.11 Temposet

With the Temposet, the travel speed can be limited from 10km/hr. on. The control of the Temposets is made with the steering column switch (7). If the Temposet is active, the indicator light (220) lights up and the set travel speed is shown momentarily on indicator (223) .

Prerquisite

- The automatic operation is turned on.
- The travel speed is > 10 km/hr.

3.11.1 Save the Temposet speed

Temposet is **not** active, the indicator light (220) does **not** light up.

- Accelerate the vehicle to the desired speed.
- Move the steering column switch in direction ⑧ or in direction ⑨ .
  The stored speed is shown momentarily on indicator (223) .

3.11.2 Show the current Temposet speed

The Temposet is active, the indicator light (220) lights up.

- Push the button ⑦ and move the steering column switch in direction ⑧ or in direction ⑨ .
  The stored speed is shown momentarily on indicator (223) .

3.11.3 Change the current Temposet speed

- Push the button ⑦ and move the steering column switch in direction ⑧ ,
  and within 10 seconds, move it again in direction ⑧.
  The speed is increased by 2 km/hr.

- Push the button ⑦ and hold the steering column switch in position ⑧ ,
  the speed is continuously increased by 2 km/hr.

- Push the button ⑦ and move the steering column switch in direction ⑨ ,
  and within 10 seconds, move it again in direction ⑨ .
  The speed is decreased by 2 km/hr.

- Push the button ⑦ and hold the steering column switch in position ⑨,
  The speed is continuously reduced by 2 km/hr.

3.11.4 Turn the Temposet off

- Move the steering column switch for longer than 10 seconds in direction ⑥.

Note: The Temposet speed is deleted if the ignition starter switch is in position "0" and the vecicle specific speed is activated.

6.2 Taking it out of service

C A U T I O N : When the independent rear axle steering is no longer required, then it must be locked again in straight forward position before driving on level ground. Axles 5 and 6 must be lowered again.

- Bring the vehicle to a standstill, on level ground.
- Set axles 7 and 8 straight.
- Lock the independent rear axle steering, button (137), turn the steering wheel to the right / left until the function indicator on the button (137) stops blinking.
- Lower the axles, buttons (143) + (132).

Note: The function runs automatically for approx. 20 seconds, the function indicator on the button (132) lights up. Function "lower 5rd and 6th axle" can be stopped via button (131).

C A U T I O N : Always check visually if the axles are fully raised or lowered!

- Switch the axle suspension / axle locking system to "suspended", button (143 + 130). The function indicator on the button (130) is off.
- Bring the vehicle to the correct height for on road travel, button (143 + 129). See chapter 3.03, Axle suspension / axle locking system.

Note: After lowering and leveling the crane, the axle suspension might sag slightly.

D A N G E R : Make sure that the rear axle steering is locked, actuate the rear axle again by moving the steering buttons (117, 118) while watching the wheels of the 7th and 8th axle, they may no longer move in / out. The rear axles must steer via the steering wheel the same way as the front axles, check visually if this is the case!

3.6 Align the crane horizontally

Note: The maximum permissible deviation from the horizontal position of the crane is ± 0.5% (± 0.3°).

D A N G E R : If the crane is not horizontally aligned, there is a danger of accidents.

3.6.1 Manually

- Align the crane horizontally be extending and retracting the individual support cylinders.

3.6.2 Automatically

Prerequisite:
All support cylinders are extended, the individual support cylinder may **not** be extended or retracted all the way to stops.

The crane can now be automatically aligned via buttons (272) and (271).

- Press button (271) "automatically up" ⇒ Support cylinders are extended
  The support height depends on the highest point of the vehicle, check the incline indicators on the support control units.
- Press button (272) "automatically down" ⇒ Support cylinders are retracted
  The support height depends on the lowest point of the vehicle, check the incline indicators on the support control units.

Note: If the vehicle is level, all 4 support cylinders are extended or retracted at the same time.

D A N G E R : Even though the crane has been automatically aligned in horizontal direction, it still has to be checked if all support plates are in contact with the ground.

3.6.3 Check the supports

Note: It must be checked if the e**xtension condition and all safety regulations** have been observed, otherwise there is a **danger of accidents!**

D A N G E R : All 4 sliding arms of the outrigger support system must be extended, even those of the opposite side of the load. If only the load-side sliding arms are extended, then it can have dangerous results.

1. **Due to the load hanging on the hook, the hoist cable and the telescopic boom (in case of operation with auxiliary boom, it too and the guy cables) are tensioned and distorted.**
   If in this situation, the load falls from the tackle cables or if the tackle or hoist cable breaks, a sudden relief will occur. The boom will flex backward, which can cause the crane to topple over.

2. **It might become necessary, contrary to previous assumption, that the load must be turned to the side. This can cause the crane to topple over.**

3. **When turning from vehicle lengthwise direction, the crane can topple over due to the boom or the counterweight momentum.**

3.7 Putting the crane into service

See chapter 4.03, STARTING UP THE CRANE.

Pos.:

370		LICCON monitor 0	- Program: Tele guying, engine monitoring, indicators
371		LICCON monitor 2	- Program: Set up, operation, control parameter, etc.
372		not used	
373		not used	
374		Foot button	- Coasting, slew gear
375		Foot pedal	- Slewing gear block
376		Foot pedal	- Telescoping
377		Foot pedal	- Engine regulation
378		not used	
379		not used	
380		Master switch left (MS 2)	
		Actuate in:	Y-direction - **Hoist gear 2 = Winch III** * (MS2Y ±), Switch (385) actuated on the rear. **Hoist gear 2 = Winch II** * (MS2Y ±), Switch (385) actuated on the front.
			X-direction - **Slewing gear left** (MS2X–) / **right** (MS2X +)
381		Button	- Control release bypass seat contact switch (deadman switch)
382	*	Switch	- actuated on the rear. Luff telescopic boom actuated on the front: Luff jib
383		Button	- actuated on the front : Luff up at overload
384		Switch	- Slewing platform lock ON / OFF
385	*	Switch	- actuated on the rear: Hoist gear 2 = Winch III actuated on the front: Hoist gear 2 = Winch II
386		Button	- Horn
387 - 389		not used	
390		Master switch right (MS 1)	
		Actuate in:	Y-direction - Hoist gear 1 (Winch I) MS1Y ±
			X-direction - **Luff telescopic boom up / down** (MS1X ±), Switch (382) actuated on the rear. **Luff luffing jib up / down** * (MS1X ±), Switch (382) actuated on the front.
391		Button	- Control release bypass seat contact switch (deadman switch)
392		Decal	- Switch positions (393)
393		Switch	- Telescoping

Position II (front) Unpin telescope
⇒ manual operation

Position 0 (center) Pin telescope, cylinder (tong)
⇒ manual operation or automatic pinning "OK"

Position I (bottom) Unpin cylinder (tong)
⇒ manual operation

2. LICCON programs (overview)

The "Set up" program **Monitor 2**

The crane operator enters the data for the selected equipment configuration in the LICCON set up program and receives the corresponding load capacity charts on the monitor. The equipment configuration is entered via dialog functions or short code.

The "Operation" program **Monitor 2**

In the LICCON operating view, symbol elements constantly inform the operator about all important crane data. All critical indications are also signaled via an acoustical signal. Depending on the configuration, a number of additional indicators can be added by the crane operator as auxiliary indicators, or will be added automatically in case of a problem.

Booting up the LICCON computer system (continuation)

If the starting procedure is completed successfully, the following appears on the monitor after successful self test of the LICCON Computer system on:

Monitor 2 The view to preselect the operating modes (operating mode preselection view).

Note: Normally, the last used operating mode preselection group is shown on the operating mode preselection view, which had been selected before the LICCON computer system was turned off. Only in case of a data loss, for example due to a cold boot (after a change of the battery or one of the CPUs, etc.) appears the **first** operating mode preselection group.

- Select the desired operating mode preselection group with the function key "F1" (move cursor down) or "F2" (move cursor up).
- With the "F8" or "ENTER" key, confirm the preselection.
  The equipment configuration view appears.

Note: If the crane operator does not select a new operating mode preselection group within 3 seconds, then the previously selected group remains in place, and the equipment configuration view appears. This means, if the previously selected operating mode preselection group should remain in place, no input is necessary.

Note: The operating mode preselection view does **not** appear if only the 50 m or only the 84 m long telescopic boom is programmed. After a successful starting procedure, the equipment configuration view will appear immediately.

Monitor 0 The view for engine monitoring / indicators as well as the symbol element for the "Tele guying * program (only if TA chart is selected or the TA-Bracket is installed).

* Optional

5) Line for special indicators
If a load capacity chart consists of more than 7 columns, then it cannot be shown completely due to the size of the monitor. In this case, arrows in the 1st field (<<) or in the 7th field (>>) in this line show that there are additional columns to the left or right, which can be viewed by pressing the arrow keys "<" or ">".
As supporting information, the currently selected column number and the number of columns in this chart is given (for example 4 (10) = 4th of 10 columns).

Note: Page to the left or right by 7 load chart columns (1 page) by using key combination "SHIFT"+"<" (E1) or "SHIFT"+">" (E2). The mark to select the goal of the telescopic sections is placed in the center.

6) Extension condition of telescopic sections in percentages [%]
In the first column is the "Boom length" [%] symbol. Next to it are 6 (3 [1)]) lines for the extension condition of the telescopic sections. The number in the symbol column applies to the corresponding telescopic section (the highest number applies to the outermost telescopic section), and the value in the boom length column shows the extension condition in percentages, which must be observed for the corresponding boom length.
The status indicator "+" next to the extension condition in percentages means that the corresponding telescopic section must be pinned.
The status indicator "–" next to the extension condition in percentages means that the corresponding telescopic section can be telescoped out under load to the extension condition value shown in percentages (according to the load capacity chart).

7) Point to final goal selection of telescopic sections via the equipment configuration view
Via the special function keys "E1" or "E2", the pointer can be moved to the right or left (see chapter 4.05 CRANE OPERATION, Automatic telescoping.

8) Line xx = Main boom angle in degrees [°] *
In this line, the main boom angles are listed, which must be set in order to be able to lift the load values in the corresponding load chart column.

Note: Appears only in operating modes TN, TAN. In this case, the number of lines for the radius values is reduced to maximum 9 lines.
See also paragraph 5.2.1 Main boom interpolation.

[1)] 50 m Telescopic boom

5.4 Other control elements

The other control elements on the LICCON indicator and control unit, which are located in the ”set up” program have the following functions:

A Alpha-numeric key block
With the keys "1" to "9" of the alpha-numeric key block, direct access is provided to the short code field in the General information line and the short code is entered.

Note: Using the alpha-numeric keys deletes all operating mode and equipment configuration dependent data from the monitor.

The keys ”P” and ”.” have no function in the ”set up ” program.

P Program keys
With the program keys you can select between the various programs. The settings entered in the equipment configuration program are thrown out and the system continues to use the equipment configuration and the reeving which had been confirmed last with "O.K.".
The currently running program **cannot be recalled** by pressing its program key.

C Input key ”ENTER”
"ENTER" is the input confirmation when entering the short code as well as when changing the equipment configuration via the function keys.
"ENTER" after short code input searches the short code in all stored load capacity charts. If the corresponding load capacity chart has been programmed into the system, then it is shown completely (including the lettering on the symbols in the function key bar), otherwise there is an error message in the form of question marks ”????” in the 2nd part of the organization number (see General information line) and the horn can be heard.
"ENTER" after changing the operating mode via the function keys searches for this operating mode, in case of success it sets the 1st equipment configuration and shows the corresponding load capacity chart and its short code. In case of an error, the short code indication remains on CODE >???<, ”axxx????” is shown as the organization number and the horn can be heard.
"ENTER" after changing the equipment configuration shows that load capacity chart,if available, with short code on the monitor. In case of an error, the short code remains on CODE>???< and the horn can be heard.

D Keyed switch
has no function in the ”Set up” program.

E Horizontal paging "E1" and "E2"
The keys "E1" and "E2" (< and >) are only functioning if it is noted in the ”line for special indications” (see paragraph 4.2).
If a load capacity chart consists of more than 7 columns, then columns 1 to 7 are always shown during the first display of the equipment configuration.
The double arrow on the right edge of the line shows that there are additional columns in the corresponding direction. If the cursor is moved to one of the arrows, then the next three columns of the chart will be displayed during the next movement in this direction.
The cursor is automatically reset to the center.

H SHIFT key
has no function in the ”Set up” program.

2.7 Three upward directed arrows show that the ”luffing up the fly jib” movement has been turned off because the upper limit (end of load chart) has been triggered. Luffing up was continued in ”installation” mode, until the limit switch was triggered ("fly jib, upper block", "fly jib, upper flap" or "flap not in position") and the luffing up function has been turned off and cannot be bypassed

Note: The fly jib can still be luffed down.

2.8 Three downward directed arrows show that the ”luffing down the fly jib” movement has been turned off because the lower limit (end of load chart) has been triggered. Luffing down was continued in ”installation” mode, until the limit switch was triggered ("fly jib, lower block"and the luffing down function has been turned off and cannot be bypassed.

Note: The fly jib can still be luffed up.

2.9 Two exclamation marks show that one or both of the dual limit switches (right and left) or angle sensor (top and bottom) of the fly jib * do not report to the bus or are defective.

Note: If both limit switches are defective, then the corresponding luffing movement is turned off (cannot be bypassed) and if the master switch is actuated, an operating error message is given. If only one of the dual limit switches or angle sensor is defective, then the crane can continue to operate with "normal function". However, increased caution must be applied, since only one limit switch is working. The error must be fixed immediately. With the exclamation marks, a system error message is given, which shows the defective limit switch or angle sensor.

6.3 Special functions

1) Symbol element "Installation Operation"

1.1 Installation
The symbol element blinks if the crane control is set to "Installation" via the installation keyed switch. Then the operating view is locked, which means no other program can be turned on via the program keys.

1.2 Emergency operation without installation
The symbol element blinks in emergency operation, if "Installation" is not selected via the installation keyed switch.

Note: In this case, the operating view is not locked.

1.3 Emergency operation and installation
The symbol element blinks in emergency operation, if "Installation" is selected via the installation keyed switch.

2) Symbol elements "Rapid gear"
The speed increase can be added for the following crane movements on master switch MS1 or MS2. The symbol element "Rapid gear" appears in the operating view.
- Hoist gear 1
- Hoist gear 2*
- Hoist gear 3*
- Telescoping
- Luffing

Note: If a crane movement has already reached its maximum speed due to its current utilization, then no speed increase is possible by adding the rapid gear.

If the total output of all selected crane movements is greater than the available output, then that crane movement is reduced, which requires the most power .

C A U T I O N : **If another crane movement is added to one or more selected crane movements, then it will have some influence on the other movements. For that reason, we recommend that in situations, where such an influence would have an effect on various individual crane movements (such as telescoping with N-attachment, positioning of loads while simultaneously selecting luffing and hoist gear), not to add the rapid gear or to turn the rapid gear off.**

6.4.6 Added function "Telescopable load" Page 2

This symbol element is shown automatically if ”Telescoping ” has been preselected via the preselector switch ”luffing / telescoping” and the telescopic boom is still pinned.
In the symbol element, the load is shown in the weight unit ([t] or [lbs]) as determined in the load capacity chart, in which the selected telescopic section is still unpinned and can be telescoped.

The indicated value starts to blink and the acoustical alarm ”SHORT HORN” can be heard, if the load on the hook is larger.

If the telescopic boom is not pinned, the same value is shown in the symbol ”Maximum load carrying capacity” (1) as in the symbol element ”Telescopable load” (6) and the symbol ”Telescopable load” (6) no longer appears automatically, only if function key "F3" is pressed.

Note: If the preselection switch is not on ”Telescoping”, the telescopable load value appears as "0.0".

D Keyed switch
The keyed switch has two positions
- engaged in center (basic position)
- touching to the right.

In this position "touching to the right" ', any shut offs which would restrict the movement can be bypassed.

a) Bypassing the overload safety device
If the maximum permissible load momentum is being exceeded, the LICCON overload safety device turns off all load moment increasing crane movements. This shut off can be bypassed with the keyed switch in position "to the right".

C A U T I O N : The overload safety device may only be bypassed if a supervisor is present, and under utmost care. All indicators of the LICCON overload safety device remain functioning.

D A N G E R : If the overload safety device is bypassed, there is no protection against overloading the crane.
This increases the risk of ACCIDENTS !

b) Bypassing the upper hoist shut off
If the hook block touches the hoist limit switch weight during an upward movement, the hoist limit switch is triggered. The crane movements 'spool up winch', 'telescope the telescopic boom out' and 'luff down the telescopic boom' are turned off. This shut off can be bypassed by turning the keyed switch to "right".

C A U T I O N : The hoist limit shut off function may only be bypassed if a supervisor is present, and if a "guide" is available. The guide must be in direct contact with the crane operator, and must monitor the distance between the hook block and the boom head at all times. All crane movements must be carried out with utmost care, at the least possible speed.

D A N G E R : If the upper hoist limit is bypassed, there is no protection against overloading the cable or the crane.
This increases the risk of ACCIDENTS !

E Special function keys
Brightness adjustment of the monitor, see paragraph 2.

H "SHIFT" key
Has no function in the operation program.

10. The program ”Outrigger support”

The "Outrigger support" program can contain two separate sections (optional).
The functions are controlled via a process visualization on the LICCON monitor, linked into the control surface to adjust the support force alarm limits.

Note: The monitor view shows the complete configuration of the "Outrigger support" program, i.e. all three parts of the program. Depending on the options, individual sections of the program are inactive and not visible on the LICCON monitor. The number values in the symbol elements are only an example and might not match the crane.

10.1 Start the program

- with program key "P3"

10.2 Configuration of program

10.2.1 Support force monitor *
10.2.2 Sliding arm length indication *

* Optional

20. The control elements in the LICCON computer system on monitor 0

The control and indicator unit for the LICCON computer systems is installed in the crane operator's cab, in direct view of the crane operator. The **LICCON monitor** consists of three basic components : display, controller and keyboard.

A Alpha-numeric keyboard
No function

P Program keys
not used

C Input key ”ENTER”
To confirm changes.

D Keyed switch
No function
The keyed switch may not be in switch position to the "left".

E Special function keys

Brightness adjustment of monitor
The brightness level of the monitor can be adjusted with this key.
- "E3" + "E1" Background illumination ON / OFF
- "E3" + "E2" Brightness adjustment in three stages

F Function keys
The function keys must always be viewed together with the function key symbol line shown on the monitor above.

G Display (Monitor)

H SHIFT key
No function

I LED indicator
I1: (LED red) Monitor error
I2: (LED yellow) Power supply for monitor available.

2. Work station - crane operator's cab

2.1 Ladder

- When driving on a public toad, the ladder must be secured in transport position (1).

- During crane operation, the ladder must be secured in working position (2).

C A U T I O N : If the ladder is hung on the platform during crane operation, it will collide with crane components.

- To enter the crane operator's cab, hang the ladder on the platform (3).

D A N G E R : The ladder must be hung and secured properly in all positions. Otherwise there is an increased danger of accidents.

2.2 Swing the crane operator's cab in / out

C A U T I O N : When turning the crane, the crane operator's cab may not be swung out by more than maximum 38° from the working position. If this is not observed, when turning the superstructure, the crane operator's cab, which is swung out to the side, can collide with the centering pin (4) for the ballast on the vehicle frame.

2.2.1 Swing the crane operator's cab from transport to working position

During transport, the crane operator's cab is swung behind the slewing platform and is mechanically secured.
- Open the mechanical lock (312).
- Swing out the crane operator's cab by pressing the button (394).

2.2.2 Swing the crane operator's cab from working to transport position

- Set the crane operator's cab into horizontal position by pressing the button (395).
- Swing in the crane operator's cab by pressing the button (394).
- Mechanically lock the crane operator's cab to the slewing platform (312).

D A N G E R : The crane operator's cab must be swung behind the slewing platform and must be mechanically secured when driving on a public road. Otherwise the crane operator's cab might swing out by itself, which can cause a serious accident.

2.3 Adjust the crane operator's cab

The crane operator's cab can be tilted upward hydraulically by approx. 20° to increase the crane operator 's field of vision.

D A N G E R : After completion of the job, the crane operator was assigned to do, the crane operator's cab must be returned to horizontal position, otherwise the crane operator cannot safely leave the cab.

2.3.1 "Tilt " the crane operator's cab "upward"

- Hold down the button (395) "on the bottom" until the desired field of visibility is reached.

Note: When the crane operator's cab is tilted, the crane door moves backward to the stop very rapidly, due to its own weight. For that reason, always hold the door by the handle and open it slowly.

2.3.2 Set the crane operator's cab to horizontal position

- Hold down the button (395) "on the top " until the horizontal position is reached.

4. LICCON Computer system after engine start

4.1 Boot up phase

The LICCON computer system runs through a self test immediately after turning it on.

Note: See chapter 4.02, LICCON COMPUTER SYSTEM.

If the starting procedure has been successfully completed, the operating mode preselection view appears on **Monitor 2**.

Note: The operating mode preselection view does **not** appear if only the 50 m or only the 84 m long telescopic boom is programmed. After successful starting procedure, the equipment configuration view will appear immediately.

Note: Normally, that operating mode preselection group is set on the operating mode preselection view, which had been selected before the LICCON computer system had been turned off. Only in case of a data loss in the memory, for example due to a cold boot (due to change of battery or a CPU, etc.), the first operating mode preselection group is shown.

- Select the desired operating mode preselection group with the function key "F1" (move cursor down) or "F2" (move cursor up).
- With "F8" or "ENTER" confirm the preselection.
  The equipment configuration view will appear on the LICCON monitor 2.

Note: If no operating mode preselection group is selected within 3 seconds, then the previous operating mode preselection group remains, and the equipment configuration is shown, without further entry. This means, if the previously set operating mode preselection group is to remain, no entry is necessary.

The view for engine monitoring / indicators as well as the symbol element for the "Teleguying" * program appears on **monitor 0**.

Note: If a master switch (manual control lever) is moved from the zero position during the boot up phase of the computer system, then the boot up phase is interrupted. An error message appears on the monitor. To delete this error message, the engine and the ignition must be turned of and the crane engine must be restarted.

* Optional

1. General

The crane operator is obligated to check the function of the safety devices before every crane operation.

D A N G E R : Danger of accidents due to defective warning and safety devices!
Crane operation with defective warning and safety devices can cause fatal accidents!
- Make sure that all warning and safety devices are functioning.
- Make sure that the overload safety device is functioning.

1.1 Check the overload safety

With fully telescoped in and horizontally aligned telescopic boom without a load and load tackle, the LICCON must show approx. the following:
- Load 0 t
- Telescopic boom length 10.2 m
- Telescopic boom angle 0°

2. Leveling instruments

To ensure crane operating safety, the crane must be in horizontal position, on level ground of sufficient load carrying capacity.

Note: The maximum permissible deviation from the horizontal position of the cranes is ± 0.5% (± 0.3°).

D A N G E R : If the crane is not horizontally aligned, then there is an increased risk of ACCIDENTS !

2.2 Superstructure

The horizontal alignment of the crane superstructure (crane incline) is shown in the crane operating view of the LICCON computer systems graphic as well as numeric, in the form of a symbol element "crane incline".

2.1 Chassis

On both sides of the vehicle is a outrigger support control unit with buttons to operate the support system as well as the electronic incline indicator.

*Optional

3.7 Hoist limit switch " Hoist top"

The hoist limit switch is installed to prevent the hook block from running onto the boom head. The hoist limit switch must be checked before every crane operation by triggering the hoist limit switch weight with the hook block to ensure it is functioning properly. If the hoist limit switch is actuated, the symbol element (2) appears in the operating view. The crane movements »lift«,
»Luff down« and »telescope out« or telescope out and in must be turned off in all N- operating modes.

D A N G E R : The hoist limit switch may only be bypassed during crane operation if a guide is available to monitor the distance between the hook block and the boom head. The guide must be in direct contact with the crane operator.
The hoist movements must be carried out with utmost care and the least possible speed.
Bypassing the hoist limit switch is only permitted in emergency situations, and only by authorized personnel! The hoist limit switch may not be used as an operational shut off function. If this is not observed, crane components can be destroyed or the crane can topple over!

3.8 Limit switch - spool winch up or out

The cam limit switch, which is installed in the winch shifts the crane movement ”down” off, if at least 3 safety coils are on the cable drum.
In addition, the spool up movement is stopped when the winch is full.

D A N G E R : If the hoist cable is spooled up in installation, it must be ensured that the cable end stays in front of the winch and is not spooled up over the winch. If the cable end is pulled over the winch for another turn, the shut off function is no longer assured if there are less than 3 safety coils on the drum.
The cam limit switch must be reset. In addition, a new hoist cable must be placed, the cam limit switch must be reset so that it shuts off if there are still 3 coils on the drum.
If this is not observed, the cable mounting can be pulled out, which can cause the load to fall off!

5.3 Hoist gear 3 - Winch 3 * (control winch for luffing lattice jib)

Prerequisites:
Preselection switch (385) moved to the rear.

Deflect the master switch 2 (390) in direction Y + = for hoist down
Deflect the master switch 2 (390) in direction Y - = for hoist up

Note: The speed of the crane movement can be controlled via the deflection of the master switch 2and via the foot pedal for the engine regulation (377). In the symbol element "Winch" **LICCON-Monitor 0** is shown that the winch turns, even though no hook movement can be seen due to multiple reeving or slow speed.

C A U T I O N : For operation of control winch as hoist gear on main boom, the cable must be unreeved from the pulley blocks.

5.4 Preselection of maximum slewing speed of winches as well as deactivating / activating the various winches

In the "Control Parameter" program (Monitor 2), it is possible to preselect the maximum slewing speed of the various winches, or to deactivate / activate the various winches.

Note: See chapter 4.02, LICCON COMPUTER SYSTEM; section 8. "Control Parameter" program.

C A U T I O N : The maximum slewing speed may not be changed and the winches may not be activated or deactivated as long as a crane movement is actuated.

* Optional

7.2.1.2 Goal selection via the telescoping view

The "Telescoping" program can be called up by pressing the program key "P4".

- The selection of the telescoping goal can be made by pressing the function key several times (such as **"F3"** = T1 = 0%, 46%, 92% or 100%), which is assigned to the corresponding telescopic section. Every time the key is pressed, the intended extension condition for the corresponding telescopic section changes to the next percentage value, which has a pin hole..

Note: After all pin holes have been shown, the indication starts again at 0%. It is not possible to select an unpinned telescopic length as the telescoping goal (from column 28 on).

Contrary to the equipment configuration view, the indicated telescopic length becomes active as a goal without further confirmation, as soon as the function key is pressed. A confirmation is not needed, since the assigned function keys have not further task.

The direction arrow in the automatic symbol immediately after a telescoping goal is changed can be interpreted as the return.

Note: If a blinking symbol element appears with a crossed out telescopic boom in the first line of the telescoping view then
- telescopic sections cannot be unpinned
- the unpinned load carrying capacity has been exceeded
- or no load chart is available.

2.1.2 Attach the hoist cable in the cable lock (Fig. 1, 2, 3)

- On the cable lock (1), remove the spring clip (2) and pull out the pin (3).
- Pin the cable lock, depending on the reeving, either on the pulley head or on the hook block and secure with spring clip.

Note: The pin (3) must always be inserted from **" the inside to the outside"** and must be secured on the outside, to prevent the hoist cable from scraping on the pin (3) or on the spring clip (2) (Fig. 3).

- On the cable lock (1), push in the retaining pin (6), swing the lever (5) ”down” and hold it in this position to move the locking lever (4) down.

C A U T I O N : The retaining mechanism (4, 5 and 6) on the cable lock must be freely movable.

- Hang the end of the cable with the fitting (8) into the cable lock and strongly pull the cable ”downward” (in direction of the arrow) until the cable fitting (8) is placed on the cone (7).

C A U T I O N : The cable fitting (8) must touch the cone (7) in the cable lock, the lever (5) must be locked by the retaining pin (6).

2.2 Unreeve the hook block (Fig. 1, 2, 3)

- Lower the hook block and place it on the ground.

C A U T I O N : Make sure the hook block is safely positioned.
If this is not observed, there is a danger of injury should the hook block tip over during unreeving.

2.2.1 Disengage the hoist cable

- On the cable lock (1), push in the retaining pin (6), move the lever (5) ”down” and hold it in this position, as this moves the locking lever (4) to the side and releases the cable fitting (8).

- Push the hoist cable ”up” and disengage the fitting (8).
- Slowly spool back the hoist cable.

D A N G E R : Make sure that nobody is in the area around the hook block. The cable can lash out like a whip when it is spooled back. A guide must make sure that no slack cable forms on the winch.

- Attach the hoist cable with a cable lock to the front tow coupling and tighten it slightly or spool up the hoist cable without the cable lock completely on the winch.

C A U T I O N : Spool the hoist cable up only to the point so that approx. 2 m remain.
Do not pull the cable end over and under the winch!

T

4.1.1.2 3-roller hook block

Reeving "normal"

Reeving:	4-way	Cable fixed point in center on pulley head. - without change over section - via change over section
Reeving:	5-way	Cable fixed point on hook block .
Reeving:	6-way	Cable fixed point in center on pulley head. - without change over section - via change over section
Reeving:	7-way	Cable fixed point on hook block .

T

11-roller hook block

Reeving "American"

Reeving:	20-way	Cable fixed point in center of pulley head - without change over section - via change over section
Reeving:	21-way	Cable fixed point on the hook block.
Reeving:	22-way	Cable fixed point in center of pulley head - without change over section - via change over section
Reeving:	23-way	Cable fixed point on the hook block.

2. Counterweight frame

The counterweight frame is part of the slewing platform and is not part of the counterweight.
If a winch or both winches W II + III are not installed, then replacement ballasts E II or E III must be installed.

Note: For weights, equipment and suspension points, see charts 1 - 4.
The 3.5 t and 2.2 t ballast plates are always installed on the counterweight frame.

Fig. 1 Counterweight frame with winch II and III

Suspensions A - A2

Chart 1

Component	Individual weight kg
Reeving winch	102.00
Winch II	2350.00
Cable for winch II	1960.00
Pulley block TN	1270.00
Counterweight frame Welding constr.	3300.00
Frame ballast	3500.00
Winch III	2520.00
Cable for winch III	3320.00
Added ballast	2200.00
Total weight	**20522.00**

5. Install the counterweight frame

Attach the counterweight frame (3) with the supplied tackle cables to the corresponding brackets (A. A1.A2.A3) and lower it into the mounting brackets (4) of the ballasting cylinders (5).

Note: For weights, equipment and suspensions, see paragraph **2**.

Pin the counterweight frame to the ballasting cylinders.
Insert pin (6) and secure with retaining bar.

D A N G E R: It must be ensured that the retaining bracket is locked.
It is prohibited to turn the slewing platform if the counterweight frame has been placed on the plates but is not yet fully raised with the ballasting cylinders.
If this is not observed, there is the danger of collision!

Unpin the pin (7).

6.3.1 Lower the counterweight frame

Press the button on the remote control or the switch in the crane operator's cab and slowly lower the counterweight frame until it touches, if all counterweight plates are installed. Do not unpin the pins (6) until the counterweight frame hangs on the tackle cables.

D A NG E R: There is a danger of tipping over if fewer counterweight plates are installed and the pins (6) are unpinned. The pins (6) may only be unpinned if the counterweight frame is suspended from the tackle cables.

Relieve the hydraulic system pressure (turn the engine off and wait approx. 5 minutes).
Release the hydraulic connections from the base plate.

2.2 Telescopic boom 84 m

		Support base wide 10 m × 9,6 m		Support base reduced 10 m × 6,25 m	
Operating mode	Ballast	to the rear	to the side	to the rear	to the side
T	135 t	to T-62,9	to T-62,9	to T-62,9	to T-62,9
T	105 t	to T-62,9	to T-62,9	to T-62,9	to T-42,1
T	90 t	to T-62,9	to T-52,5	to T-62,9	to T-36,9
T	75 t	to T-42,1	to T-42,1	to T-42,1	to T-26,5
T	60 t	to T-36,9	to T-36,9	to T-36,9	to T-26,5
T	45 t	to T-36,9	to T-31,7	to T-36,9	to T-26,5
T	30 t	to T-26,5	to T-26,5	to T-26,5	T-16,1
T	15 t	to T-26,5	to T-21,3	to T-26,5	T-16,1
T	0 t	T-16,1	T-16,1	T-16,1	no

3. Installation

D A N G E R: **Risk of falling!**
During assembly and disassembly, personnel must be secured with appropriate antifall guards to prevent them from falling. If this is not observed, personnel could fall and suffer life-threatening injuries.
- **All assembly work from a height of 2 m must be carried out using suitable aids (lifting platforms, scaffolding, ladders, auxiliary crane etc.)! The height above which assembly/disassembly work must be carried out with aids depends on national regulations. The national regulations must be adhered to!**
- **If work cannot be carried out on the ground or using such aids, then assembly personnel must be secured with suitable personal protective equipment (such as catch belts) to protect against falling! A description of the fastening points for personal protection equipment is given in chapter 2.06.**

Prerequisites:
- The crane is properly supported and horizontally aligned.
- The counterweight is installed on the slewing platform according to the load chart.
- The telescopic boom is fully telescoped in.
- The telescopic boom is luffed down all the way to the rear or to the side.
- The LICCON overload safety system is set according to the data given in the load charts.
- The keyed button ”installation” is actuated, the indicator light ”installation” lights up.
- The installation symbol on the LICCON indicator blinks.

4.3 Erection

Actuate the manual control lever and luff up the telescopic boom with installed lattice jib until the end section lifts off the ground.

Reeve in the hoist cable between the pulley head on the end section and the hook block and secure on the fixed point - see chapter 4.06, Reeving plans.

The weight of the hook block that has been taken into account is the hook block weight that is required to lift the maximum load for the corresponding boom combination.

D A N G E R: It is not permitted to reeve in a larger hook block than is required to lift the maximum load as noted in the load chart.
If this is not observed, the crane can be overloaded or topple over.

Attach the hoist limit switch weight.

Luff up the telescopic boom into the steepest telescopic boom position.

Telescope the telescopic boom out.

If the symbol "Telescopic boom crossed out" appears in the telescoping view, then the telescoping procedure cannot be carried out, which means the conditions for the "unpinning" release are not met.

The symbol only appears if telescoping is actuated and the pins cannot be released.

The symbol signals that the telescopic boom is not yet luffed up into a range, where the release for unpinning can be given.

For that reason, continue to luff up the telescopic boom until the symbol (B) no longer appears in the telescoping view and **"unpinning clear"** is given when actuating a telescoping movement.

5. Crane operation - TF

C A U T I O N : Observe all notes in chapter 4.05 ” CRANE OPERATION ” and chapter 4.08 ”WORKING WITH A LOAD ” !

Prerequisites:
- Set the LICCON overload safety system according to the data given in the load chart.
- Turn the installation keyed button off by pressing the button.
  The installation symbol on the LICCON indicator is off.

D A N G E R: Check the horizontal position of the crane before and during operation.
If the crane operator leaves the crane operator's cab, even if only for a short time, then he is obligated to check all operating mode settings and to reset them, if necessary, before starting to work again.

Adjustments / checks
Check the function of the overload safety system by triggering the operating positions ”on the top” and ”on the bottom”.
Check the function of the hoist limit switch ”top” by running against the hoist limit switch weight.

2.1 Components for luffing lattice jib

Pos.	Description	Length	Qty.
1	Guy rod	6,705 m	2
2	Connector bracket	0,295 m	7
3	Guy rod	6,850 m	2
4	Guy rod	6,560 m	2
5	Swing	3,205 m	1
6	Guy rod	6,385 m	4
7	Connector bracket	0,615 m	8
8	Connector bracket	0,505 m	1
9	Guy rod	1,105 m	1
10	Spring retainer ∅ 6 mm		24
11	Pin for guy rods ∅ 54 x 235 mm		14
12	Guy rod	6,175 m	2
13	Connector bracket	0,800 m	4
14	Guy rod	6,360 m	2
15	Connector bracket	0,295 m	4
16	Connector bracket	0,295 m	4
17	Pin ∅ 65 x 101 mm		16
18	Ring retainer 55×3 mm		16
19	Pin ∅ 65 x 150 mm		4
20	Connector bracket	0. 300 m	2
21	Guy rod	6.700 m	2
22	Guy rod	2.700 m	1
23	Pin for guy rods ∅ 55 x 170 mm		6
24	Set up cart		1
25	Washer ∅ 80 x 2		40

Note: The guy rods (21. 22) and the connector brackets (20) are required if the lattice jib is to be installed while folded down.
If the telescopic boom is fully telescoped in, the guy rods (21, 22) and connector brackets (20) are installed, the lattice jib cannot be luffed up.

3.3 Reeving plan - pulley block

The reeved in "lower" and "upper" pulley blocks are stored in transport position above winch II.

Note: If the pulley blocks are not reeved, then they must be reeved according to the reeving plan (Fig.1).

Reeving plan - N- pulley
The cable of winch III must be reeved between the upper and lower pulley block, according to fig. 1.

1 "Upper" pulley block

2 "Lower" pulley block

3 Cable fixed point

4 Cable lock

III Winch III

4.3 Installation of the hoist cables

Guide the auxiliary cable (3) of the installation winch (4) over the cable pulley on the telescopic boom head and the auxiliary change over pulleys (1, 5) in the TN/TF- adapter to the cable pulley (2) in the end section.

From there, pull it over the change over pulleys on the NA -bracket II (6) to the hoist cable (7) of the hoist winch.

Connect the auxiliary cable (3) with the hoist cable (7).

Spool up the auxiliary cable (3) and at the same time, spool out the hoist cable (7).

Note: Pull out the hoist cable approx 5 - 10 m, depending on the required reeving, past the pulley head of the lattice jib to be able to reeve the hook block later.

Attach the hoist cable on the pulley head of the lattice jib.

C A U T I O N : Watch the cable routing. Make sure no slack cable forms!

When pulling in the hoist cable, make sure that there is nobody in the danger zone. There is a danger of life and death should the cable break!

When reeving the hoist cable it must be ensured that the cable runs inside of the frame formed by the added guying.

If this is not observed, the hoist cable will scrape on the added guying after erection.

D A N G E R : If the hoist cable is not attached on the boom head, there is the danger that the cable falls onto the crane vehicle, due to its own weight when the jib is erected.

5.2 Erection procedure

Prerequisite:
- Set the LICCON overload safety system according to the data given in the load charts and the equipment configuration (**see chapter 4.02, 4.03**).
- Actuate the installation keyed button (424), the indicator light (425) "installation" lights up.
- The installation symbol on the LICCON indicator blinks.

Adjust in the EQUIPMENT CONFIGURATION VIEW of the LICCON (see chapter 4.02)
Enter the 4-digit code number according to the corresponding load chart and confirm with the ENTER key.
Enter the current reeving.
Check the current equipment configuration of the crane with the entered data to ensure they match.
Press the function key **-F8-** "o.k.".the OPERATING VIEW appears.

D A N G E R : **Check and compare the LICCON settings with the actual equipment configuration.**
If this is not observed, the crane be overloaded or can topple over!

Indicators in the OPERATING VIEW during the erection procedure
The following alarm functions are activated (blink) during the erection procedure, until the operating position is reached:

- "STOP"
- "HORN" + Acoustical signal

Note: The lowest operating position is reached when the indicators turn off and a load value (in tons - t -) appears in the symbol "MAX. LOAD" instead of the question marks (???).

Turn off the installation keyed button by pressing the button.
The installation symbol on the LICCON indicator turns off.

D A N G E R : **After the lowest operating position is reached, the installation keyed button must be turned off immediately.**
The installation keyed button bypasses the safety devices!
The radii given in the load chart may not be exceeded nor fallen below, even without a load on the hook!
If this is not observed, the crane can topple over!

7. Take down procedure

7.1 Take down in folded down position - WITHOUT - NA- bracket III

Set the telescopic boom to 83° and telescope it in all the way **- Fig. 1**.

D A N G E R: Telescoping in and out with installed lattice jib is only permitted with the telescopic boom in steepest position of 83°.
The lattice jib must be at an angle to the horizontal, for which the LICCON control gives the telescoping release.
If the telescopic boom is in 68° operating position, then it must first be luffed up to 83°, steepest position.
The data given in the erection and take down charts must be strictly observed!

Take down procedure
Switch (382) must be set to telescopic boom luffing. Actuate switch (382) on back side.
Actuate the manual control lever MS1x and luff down the lattice jib to the **lowest** operating position.

Note: When the lowest operating position is reached, the luffing down movement is shut off. The load indication turns off in the symbol ”MAX. LOAD” and question marks (???) appear.

At the same time, the following alarm functions are activated (blink) in the OPERATING VIEW:
- ”STOP”
- ”HORN” + acoustical signal

C A U T I O N : When luffing down, the hoist winch must be spooled out at the same time to prevent the hook block from colliding with the end section of the lattice jib.

Actuate the installation keyed button (424), the indicator light (425) ”installation” lights up. The installation symbol on the LICCON indicator blinks.

D A N G E R : The overload safety system is no longer effective.
The limit switch hoist ”top” is bypassed.

Continue to luff down the lattice jib until an angle of approx. 97° is reached between the telescopic boom and the lattice jib - **Fig. 1**.
Switch (382) must be set to telescopic boom luffing. Actuate switch (382) on back side.
Actuate the manual control lever MS1x and luff down the telescopic boom until the hook block touches the ground.
Remove the hoist limit switch weight.
Unreeve the hook block.

D A N G E R : When unreeving the hoist cable, make sure that there are no persons within the danger zone.

Install the set up cart on the N- end section **- Fig. 2**.
Continue to luff down the telescopic boom, the lattice jib rolls on the ground.

Actuate the lattice jib control winch III = hoistinggear 2) to prevent slack cable from forming on winch III. Switch (385) must be set to winch III. Actuate switch (385) on back side.

D A N G E R : The lattice jib must roll on the ground with its complete weight.
Lower the lattice jib control in such a way, that the guy rods always hang through slightly.
Make sure that no slack cable forms on the control winch!
If this is not observed, the crane can be overloaded or topple over!

Spool back the hoist cable to the telescopic boom head.

8.2 Removal of installation unit

Attach the NA- bracket II to the auxiliary crane, pull it up a little and set the guy rod into the glide rail. Lower the NA- bracket II with the auxiliary crane onto the NA- bracket I.

C A U T I O N : Set the vertically hanging support rod into the glide rail so that it can glide up sideways into the receptacle.
Then the NA - bracket II may be lowered.

Take on the installation unit with the auxiliary crane on the tackle points on the pivot section (1).

Note: The total weight of the installation unit is approx. **11,3 t.**
The total weight of the installation unit is approx. **13.1 t with the TN/TF- adapter.**

D A N G E R : Unpin horizontally-mounted double cone pins from outside to inside!

Unpin the installation unit on the TN/TF- adapter or the telescopic boom head.

3.2 Instrument panel , right

417 Switch - TY3-guying: Fold TY-brackets out /in

Position II	(right)	Fold TY-brackets out
Position 0	(center)	OFF
Position I	(left)	Fold TY-brackets in

C A U T I O N : The button (417)may not be actuated if the TY-bracket is placed on the telescopic boom. Otherwise damage can result to the TY-brackets, the guy rods or the rod receptacles. The button (417) may only be actuated if the TY-brackets are fully erected and not guyed (latches open) .

418 Button - TY3-guying: Lock TY-bracket left (A)

419 Button - TY3-guying: Lock TY-bracket right (B)

6. Install the guy ropes

Prerequisite:
- The TY-brackets are fully erected.
- The telescopic boom is fully luffed down.

6.1 Preparations

Note: In order to be able to spool the guy winches, the latch must be opened. The following conditions must be met:
- The actual pressure(p) in the tension cylinder must be less or the same as the relief pressure (pe) . The actual pressure (p) and the relief pressure (pe) is shown in symbols (2 and 4) .
- If the actual pressure (p) is larger than the relief pressure (pe) of the corresponding cylinder, then the corresponding "actual pressure display" (p) blinks when the function key (F3) is actuated .
  In addition, the operating error "Button - latch is actuated with excessive pressure in the tension cylinder A/B" is issued.

- Press function key (F3) and open the latches .

Result:
- When opening the latches, the guy winches make a short spool up movement.
- The symbol (8) blinks until the latches open and the tension cylinders are retracted.
- With open latches, the symbol (8) lights up statically and the spool up movement of the corresponding winch is stopped.

- Release the brackets (7) for the guy ropes at point (B) .
  Loosen the spring retainers (46).

D A N G E R : When the brackets (7) for the guy ropes are released, then they can disengage when the TY brackets fold out and swing out at high speed. Make sure that there are no persons or objects within this area.

- Move the button (417) to the right and fold out the TY-brackets to approx. 3° .

Note: Then the guy ropes can be released and guided forward to the guy point on the pulley head.

- Press function key (F6) and activate the corresponding winch to spool out.
- Press function key (F5), spool out both guy ropes and pull forward by hand.

10. Tension the TY-brackets

C A U T I O N : When the telescopic boom is guyed, the TY-bracket angle can no longer be changed.

Prerequisites for release for tensioning the TY-brackets:
- The TY-brackets are folded out to the corresponding TY-bracket angle.

- The seat contact switch is actuated.

- The telescopic boom is telescoped out to the corresponding length and all telescoping sections are pinned.

- The "actual load " shown in the LICCON operating view must be smaller (<) than the permissible hook block weight.
  If this is not the case, when pressing the function key (F4), the "actual load display " in the operating view blinks and the maximum permissible load for guying is shown in the symbol "Max load" . This is the permissible hook weight. In addition, when the function key (F4) is pressed, the operating error "Button - guy telescopic boom is actuated without release LMB, angle, load, BA" is issued .

- The telescopic boom is luffed up to the corresponding pretension angle. That the pretension angle has been reached is shown by the appearance of an exclamation mark in front of the blinking pretension angle.
  If the pretension angle is not yet reached, then , when the function key (F4) is pressed, the operating error "Button - guy tele is actuated without release LMB, angle, load, BA" is issued.

- The TY-brackets are fully erected.
  The symbol (10) is shown on the monitor.
  If this is not the case, when pressing the function key (F4), the operating error "Button - guy tele and TY bracket not in position" is issued.

- The latches are open, the telescopic boom is not guyed.
  The symbol (8) is shown on the monitor.
  If this is not the case, when pressing the function key (F4), the operating error "Button - guy tele actuated with closed latch" is issued.

- The limit switches may not report extended TY-tension cylinders.
  As soon as one of the two limit switches reports a fully extended tension cylinder, the symbol (9) remains on statically and the tension procedure cannot be initiated .
  If this is not the case, when pressing the function key (F4), the operating error "Button - guy tele actuated with tension cylinder on block" is issued.

12.5 Disassembly procedure

C A U T I O N : The guy rods must be secured with turn buckles and brackets for transport before lifting them with the auxiliary crane .

Note: Total weight TY3-Guying approx. 13,3 t.

- Hang the TY-bracket on the tackle points on the auxiliary crane .

- Swing the spacer rod (20) from operating to transport position, pin (21) and secure (22).

- Unpin the guy rods on both sides from the cross brackets.

- Secure the guy rods on both sides with the chain (35) on the TY bracket (36, 37).

- Secure the guy rods on both sides with turn buckle (29) (30, 31).

- Fold both transport brackets (34) up and secure (32, 33).

- Install turn buckle (25) with assembly chain (28) on the erection cylinders on both sides and secure (26, 27).

- Release both pins (43) of the erection cylinders in point (B) (44) and unpin.

Before connecting or releasing hydraulic lines, the engine must be turned off .
The hydraulic lines which belong together are marked.
- Release the electrical connection for the TY-bracket and secure in the receptacle.

- Release the hydraulic connection for the TY-bracket and secure in the receptacle .

- Release both pins (23) in point (A) (24) and unpin.

- Lift the TY - bracket with the auxiliary crane all the way and remove.

5. Telescoping procedure

Telescope in or out to the telescopic boom length given on the load chart.

D A N G E R: Telescoping in and out with installed lattice jib is only permitted with the telescopic boom in steepest position of 83°.
The lattice jib must be between at an angle to the horizontal where the LICCON control gives the telescoping release - see charts below.
Telescoping out and in with suspended load is prohibited!

5.1 N- angle window to telescope the telescopic boom TN/TY3N out

N - Lengths	N-21	N-28	N-35	N-42	N-49	N-56	N-63	N-70	N-77	N-84	N-91
N-angle window for telescoping **T-84 m**	0°-73°	0°-73°	0°-73°	30°-73°	50°-73°	63°-73°	63°-73°	63°-73°	63°-73°	63°-73°	63°-73°
N-angle window for telescoping **T-50 m**	0°-73°	0°-73°	0°-73°	30°-73°	30°-73°	58°-73°	58°-73°	58°-73°	58°-73°	58°-73°	58° - 73°

5.2 N- angle window for total T -Length ≤ 92 %

N - Lengths	N-21	N-28	N-35	N-42	N-49	N-56	N-63	N-70	N-77	N-84	N-91
N-angle window for telescoping **T-84 m**	0°-73°	0°-73°	0°-73°	30°-73°	40°-73°	40°-73°	40°-73°	40°-73°	40°-73°	40°-73°	40°-73°
N-angle window for telescoping **T-50 m**	0°-73°	0°-73°	0°-73°	30°-73°	30°-73°	40°-73°	40°-73°	40°-73°	40°-73°	40°-73°	40°-73°

5.07 FIXED LATTICE JIB, T - GUYED - TY3F 026820-00

1. Description

For the **TY3F**-boom combination, the telescopic boom is also guyed, in comparison to the **TF** - operation. The fixed lattice jib,T - guyed - TY3F, can be operated in the following **working lengths (paragraph 1.1/1.2) on the 50 m and 84 m guyed telescopic boom**.
It can be installed as a straight extension 0° or at an angle of 20° or 40° to the telescopic boom.

Note: The guy point is always on the cross bar on the TN/TF- adapter.

5.2 84 m Telescopic boom

Boom length [m] (Extnesion condition telescoping sections) [%]	**Angle** **Fixed Lattice Jib** [°]	**Pretension angle** **Telescopic-boom α** [°]	**TY-bracket angle** **β** [°]	**Hook block weight** [t]
T - 47.3 (92/92/92/0/0/0) + A-2,2 + F-6	0°	77°	10°	3,5
T - 47.3 (92/92/92/0/0/0) + A-2,2 + F-6	20°/40°	77°	10°	2,6
T - 47.3 (92/92/92/0/0/0) + A-2,2 + F-14	0°/20°/40°	77°	10°	2,6
T - 47.3 (92/92/92/0/0/0) + A-2,2 + F-21	0°/20°/40°	77°	10°	2,6
T - 47.3 (92/92/92/0/0/0) + A-2,2 + F-28	0°/20°/40°	77°	10°	1,4
T - 47.3 (92/92/92/0/0/0) + A-2,2 + F-35	0°/20°/40°	77°	10°	1,4
T - 47.3 (92/92/92/0/0/0) + A-2,2 + F-42	0°/20°	77°	10°	1,4
T - 47.3 (92/92/92/0/0/0) + A-2,2 + F-49	0°	77°	10°	0,6
T - 47.3 (92/92/92/0/0/0) + A-2,2 + F-56	0°	77°	10°	0,6
T - 57.7 (92/92/92/46/46/0) + A-2,2 + F-6	0°/20°/40°	77°	10°	2,6
T - 57.7 (92/92/92/46/46/0) + A-2,2 + F-14	0°/20°/40°	77°	10°	2,6
T - 57.7 (92/92/92/46/46/0) + A-2,2 + F-21	0°/20°/40°	77°	10°	2,6
T - 57.7 (92/92/92/46/46/0) + A-2,2 + F-28	0°/20°/40°	77°	10°	1,4
T - 57.7 (92/92/92/46/46/0) + A-2,2 + F-35	0°/20°/40°	77°	10°	1,4
T - 57.7 (92/92/92/46/46/0) + A-2,2 + F-42	0°/20°	77°	10°	1,4
T - 57.7 (92/92/92/46/46/0) + A-2,2 + F-49	0°	77°	10°	0,6
T - 57.7 (92/92/92/46/46/0) + A-2,2 + F-56	0°	77°	10°	0,6
T -68,1 (92/92/92/92/46/46) + A-2,2 + F-6	0°/20°	77°	10°	2,6
T -68,1 (92/92/92/92/46/46) + A-2,2 + F-6	40°	77°	10°	1,4
T -68,1 (92/92/92/92/46/46) + A-2,2 + F-14	0°/20°/40°	77°	10°	2,6
T -68,1 (92/92/92/92/46/46) + A-2,2 + F-21	0°/20°/40°	77°	10°	1,4
T -68,1 (92/92/92/92/46/46) + A-2,2 + F-28	0°/20°/40°	77°	10°	1,4
T -68,1 (92/92/92/92/46/46) + A-2,2 + F-35	0°/20°/40°	77°	10°	1,4
T -68,1 (92/92/92/92/46/46) + A-2,2 + F-42	0°/20°	77°	10°	1,4
T -68,1 (92/92/92/92/46/46) + A-2,2 + F-49	0°	77°	10°	0,6
T -68,1 (92 /92/92/92/46/46) + A-2,2 + F-56	0°	77°	10°	0,6

2.1 Installation notes

TVF Differing from the TF- installation, the 14 m extension (V) is installed between the TF/TN-adapter (G1) and the TF- adapter (G2).

TVY3F Differing from the TF- installation, the 14 m extension (V) is installed between the TF/TN-adapter (G1) and the TF-adapter (G2).
Guying at the cross bar on 14 m extension.

TVN Differing from the TN- installation, the 14 m extension (V) is installed between the TF/TN-adapter (G1) and the N- installation unit (1).

TVY3N Differing from the TN- installation, the 14 m extension (V) is installed between the TF/TN-adapter (G1) and the N- installation unit (1).
Guying at the cross bar on TN/TF-adapter (G 1)

C A U T I O N : The installation of the luffing jib unit (TYN, TYV3N) must be completed before the TY- bracket may be set up. If this is not observed, the cables of the pulley block will run over the TY hoist cable change-over bracket. Danger of slack cable formation!

2.1.1 Installation of cross bar on TN/TF adapter

- Pin the cross bar (1) with pin (52) on both sides and secure (51).
- Pin the brackets of the guy ropes on both sides (42) and secure with washer and hinge pin (41) .

Note: For installation / removal of guy ropes, see chapter 5.05, TELESCOPIC BOOM GUYED TY.

5. Crane operation

C A U T I O N : Observe all notes in chapter 4.05 " CRANE OPERATION " and chapter 4.08 "WORKING WITH A LOAD ".

Prerequisites:
- The LICCON overload safety device is set according to the data given in the load chart.
- The installation keyed button is turned off by pressing the button.
  The installation symbol on the LICCON indicator is off.

D A N G E R : Check the horizontal position of the crane before and during the operation. If the crane operator leaves the cab, even if only for a short time, then he is obligated, before starting to work again, to check the operating mode settings and to reset them, if necessary.

Settings / checks
Check the function of the overload safety device by triggering the operating positions **"on top"** and **"bottom"**.
Check the function of the hoist limit switch **"on top"** by running against the hoist limit switch weight.

5.1 TVN- Operation with installed TA- bracket

If the TA- bracket is installed in TVN- operation, then it must lay on the telescopic boom. The guy rods are in their intended receptacles.
The hoist cable must be guided over the TY- bracket.

D A N G E R : TVN- operation with raised TY-bracket without utilization of the telescopic guying is prohibited (fig.).
The large weight of the telescopic guying would reduce the measured force in the luffing cylinder and as a result, would show a smaller load, which in turn can cause the crane to be overloaded.

5.2 Telescoping procedure

Telescope out or in to the telescopic boom length given on the load chart.

C A U T I O N : In case of strong side winds, the telescopic boom with installed luffing jib must be turned into the wind. Otherwise, the telescopic sections will be twisted!

D A N G E R : Telescoping out and it with installed lattice jib is only permitted at steepest position of the telescopic boom, at 83°.
The lattice jib must be at an angle to the horizontal, where the LICCON control gives the telescoping release - see charts below.
Telescoping in and out with suspended load is strictly prohibited!

5.3 N- angle window to telescope the telescopic boom TVN / TVY3N out

N - Lengths	N-21	N-28	N-35	N-42	N-49	N-56	N-63	N-70	N-77	N-84
N-angle window when telescoping **T-50 m**	0°-73°	0°-73°	0°-73°	30°-73°	50°-73°	63°-73°	63°-73°	63°-73°	63°-73°	63°-73°

2. Assembly of lattice jib

The following lattice jib length can be assembled:

Total length: **63 m**
Lattice sections: G1 + G2 + G3 + G3 + G4 + G5 + G6 + G7 + G8

Total length: **56 m**
Lattice sections: G1 + G2 + G3 + G3 + G4 + G5 + G7 + G8

Total length: **49 m**
Lattice sections: G1 + G2 + G3 + G4 + G5 + G7 + G8

Total length: **42 m**
Lattice sections: G1 + G2 + G3 + G4 + G5 + G6 + G8

Total length: **35 m**
Lattice sections: G1 + G2 + G3 + G4 + G5 + G8

Total length: **28 m**
Lattice sections: G1 + G2 + G3 + G3 + G5 + G8

Total length: **21 m**
Lattice sections: G1 + G2 + G3 +G5 + G8

Total length: **14 m**
Lattice sections: G1 + G2 +G5 + G8

Total length: **6 m**
Lattice sections: G1 + G2+special auxiliary boom *

Note: One 14 m long intermediate sections can be installed instead of two 7 m intermediate sections.

D A N G E R : It is not permitted to assemble the lattice sections and guy rods in any other way than noted in the Operation Manual or the installation drawings!
When installing the lattice jib, it must be ensured that the intermediate sections are installed according to their description .
If this is not observed, there is a danger of causing a serious accident!

* Optional

4.3 Erection

Actuate the master switch **MS1** and telesope all the way in, luff up the telescopic boom until the lattice jib end section lifts off the ground.

Reeve in the hoist cable between the pulley head on the end section and the hook block and secure on the fixed point - see chapter 4.06, Reeving plans.

As the hook block weight, the weight of the hook block has been taken into account, which is required to lift the maximum load for the corresponding boom combination .

D A N G E R : No larger hook block may be reeved than is necessary to lift the maximum load given in the load chart.
If this is not observed, the crane will be overload or tip over!

- Attach the hoist limit switch weight.
- Luff up the telescopic boom into the steepest telescopic boom position.
- Telescope the telescopic boom out.
- If the symbol "telescopic boom crossed out" appears in the telescoping view, then it cannot be telescoped, which means the conditions for the **"unpinning"** release are not met.
- The symbol only appears if one tries to telescope and it cannot unpinned.
- The symbol signals that the telescopic boom is not yet luffed up into a range, in which the release for unpinning can occur.
- For that reason, continue to luff up the telescopic boom until the **"unpinning clear"** is issued when actuating a telescoping movement, i.e. the symbol does no longer appear in the telescoping view.

5. Crane operation - TNZF

C A U T I O N : Make sure to observe all notes in chapter 4.05 ” CRANE OPERATION ” and chapter 4.08 ”WORKING WITH A LOAD ” .

Prerequisites:
- The LICCON overload safety device is set according to the data in the load chart .
- The installation keyed button is turned off. The installation symbol on the LICCON indictor turns off.
- The installation symbol on the LICCON indicator is off.

D A N G E R : Check the horizontal position of the crane before and during operation.
If the crane operator leaves the crane operator's cab, even if only for a short time, then he is obligated to check all operating mode settings and to reset them, if necessary, before starting to work again .

Adjustments / checks
- Check the function of the overload system by running against the ”top” and ”bottom” operating positions.
- Check the function of the hoist limit switch ”on top” by running against the hoist limit switch weight.

Note: Cable reeving for TNZF operation, see chapter 4.06 // Reeving TF operation

5.10 BOOM NOSE - 12t / 48t 024570-03

1. General

Boom nose operation has been designed for quick hoist movements via the boom nose, whereby the hook block remains reeved on the main boom.

Note: No extra charts are programmed for operation with boom nose. The corresponding load charts are valid, however, the load carrying capacity must be reduced by the weight of the boom nose as well as the tackle, which is used to take on and attach the load.

C A U T I O N : The hoist limit switch on the boom nose must be connected and fully functioning.

Boom nose on telescopic boom head (12 t) (Fig. 1)

Reeving maximum: 1-way

Individual weight: approx. 133 kg

Boom nose on N- end section (12 t) (Fig. 2)

Reeving maximum: 1-way

Individual weight: approx. 225 kg

.

Note: For installation / removal, see section 3; Boom nose (12t) on N-end section

* Optional

3.2.1 Hoist cable routing for boom nose (12t) on N-end section

3 = Cable pulley N- end section
4 = Cable pulley NA- bracket II
5 = Cable pulley boom nose
WII = Winch II

2. Position the pulley block for crane operation with winch 1

Description
Before crane operation with winch 1, and winch 3 is installed but not needed, the position of the pulley block must be changed before starting to work.
The pulley block must be brought from transport position (fig. 7) into the intermediate position (fig. 8) and pinned there with pin (11) .
This is necessary to prevent damage to the hoist cable or the crane.

C A U T I O N : Before crane operation with winch 1, the pulley block must be pinned and secured in intermediate position (Z) (fig. 9) (fig. 8).
If this is not observed, the hoist cable or crane can be damaged!

Procedure
- Release the pin (11) in transport position (T) . To do so, remove the spring retainers (12) (fig. 10) and unpin the pins (11) on the pin point (T) of the winch frame (3) (fig. 7 // fig. 9)on both sides.

D A N G E R: It must be ensured that the pins (11) are unpinned on winch 3 on both sides.
If this is not observed, there is a danger of accidents!

- Attach the tackle to the pulley block.
- Pull the pulley block with the auxiliary crane slowly up (arrow) (fig. 7), until the bore holes (Z) of the pulley block (fig. 3) and the bore holes (Z) of the winch 3 (3) (fig. 9) align.
- Watch for slack cable formation.
- Pin the pulley block with pin (11) to winch 3 (fig. 8).
- Secure the pin (11) with spring retainer (12) .
- The pulley block angle is 35° (fig. 8).

D A N G E R: It must be ensured that the pins (11) are pinned and secured on both sides on winch 3 .
If this is not observed, there is a danger of accidents!

- Remove the tackle from the pulley block.

Note: If the pulley block is pinned and securd in intermediate position (Z) (fig. 8), then the winch 1 can be operated within the framework of the applications described in the Operating Manual.

84 mTelescopic boom (68,1 - 78,6 m)

Boom length [m] (Extnesion condition telescoping sections) [%]	**Pretension angle** **Telescopic boom** **α** [°]	**TY-bracket angle** **β** [°]	**Pretension angle** **Luffing jib** **γ** [°]	**Hook block weight** [t]
T-68,1 (92/92/92/92/46/46) + A-4 + N-21	83°	42°	25°	2,6
T-68,1 (92/92/92/92/46/46) + A-4 + N-28	83°	42°	30°	1,4
T-68,1 (92/92/92/92/46/46) + A-4 + N-35	83°	42°	50°	1,4
T-68,1 (92/92/92/92/46/46) + A-4 + N-42	83°	42°	55°	1,4
T-68,1 (92/92/92/92/46/46) + A-4 + N-49 bis N-63	83°	42°	65°	1,4
T-68,1 (92/92/92/92/46/46) + A-4 + N-70	83°	42°	65°	0,6
T-78,6 (92/92/92/92/92/92) + A-4 + N-21 bis N- 35	83°	42°	55°	1,4
T-78,6 (92/92/92/92/92/92) + A-4 + N-42	83°	42°	65°	1,4
T-78,6 (92/92/92/92/92/92) + A-4 + N-49 bis N-56	83°	42°	65°	0,6

Note: The guying position is independent of the extension condition of the telescopic boom and the lattice jib length.

C A U T I O N : If the given values are being exceeded or if the hook block weights and pretension angles are not adhered to, then there is the danger of overloading the crane .

2.2.4 Unlocking the telescope 3 from telescope 4

C A U T I O N : **The locking pins (40) of telescope 3 may not be turned down too far during the mechanical release. If this is not observed, the tong can be seriously damaged!**

Note: The crank and the emergency unlocking screw are part of the on-board tools.

Release the pinning between telescope 3 and telescope 4 manually with the aid of the crank.
- Turn the emergency unlocking screw (41) with the crank into the locking pin (40) and turn the locking pin downward only as far as necessary.
- Remove the crank.

2.2.5 Retract telescopic section 3
- Fully retract and pin telescopic section 3.

Note: When retracting the telescopic sections 3, interrupt the telescoping procedure as soon as the rear bearing shoes of telescopic section 4 are visible. Ensure that the rear bearing shoes of telescopic section 4 are cleared by luffing up or down or turning the superstructure.

2.2.6 Place telescopic sections down and secure

D A N G E R : **The telescopic sections must be laid down properly on the transport device before starting to travel and must be secured properly with the rigging belts (4) .**
If this is not observed, there is a danger of accidents!

- Place telescopic section 4 with telescopic section 5 and telescopic section 6 onto the transport device and secure with rigging belts (4) .

2.2.7 Remove the counterweight
- Set the counterweight frame and counterweight plates on the chassis.
- Remove the counterweight frame and the counterweight plates with the auxiliary crane and set on the transport vehicle.

2.2.8 Ready to drive the crane
See chapter 3.04, DRIVING ON PUBLIC ROADS.

D A N G E R : **Before driving the crane it must be ensured hat the telescopic sections are secured to prevent them from slipping out when the crane is slowed down or when the crane is driving downhill. If this is not observed, there is a danger of accidents .**

7. Pretension angle and hook block weights

Luff the telescopic boom up to the required pretension angle **α** .
Telescope the telescopic boom out to the required extension condition.
Fold the TY-brackets out to 10° .

D A N G E R : The telescipic boom may only be guyed if the pretension angles and the hook block weights given in the chart are adhered to.
It is prohibited to guy in other boom positions or in other pretension angles or to place the latch, which could result in a possible overload of the telescopic boom or the tele guying.

7.1 50 m Teleskopic boom

Chart is valid for: TY3NZF 0°

Boom length [m] (Extension condition telescopes) [%]	**Pretension angle Telescopic boom α** [°]	**TY-bracket angle β** [°]	**Hook block weight** [t]
T - 47.3 (92 /92 /92) + A-2,2 + F-6	72°	10°	3,5
T - 47.3 (92 /92 /92) + A-2,2 + F-14	72°	10°	2,6
T - 47.3 (92 /92 /92) + A-2,2 + F-21	72°	10°	2,6
T - 47.3 (92 /92 /92) + A-2,2 + F-28	72°	10°	1,4
T - 47.3 (92 /92 /92) + A-2,2 + F-35	72°	10°	1,4
T - 47.3 (92 /92 /92) + A-2,2 + F-42	72°	10°	1,4
T - 47.3 (92 /92 /92) + A-2,2 + F-49	72°	10°	1,4
T - 47.3 (92 /92 /92) + A-2,2 + F-56	74°	10°	1,4
T - 47.3 (92 /92 /92) + A-2,2 + F-63	74°	10°	0,7

C A U T I O N : If the given values are exceeded, or the hook block weights and the pretension angle are not adhered to, there is the danger of overloading the crane.

5. Move the slewing platform in travel direction to the rear

Connect both luffing cylinders with cable (7) and turn buckle (8) (View "A").

Attach the retaining cable (9) on the luffing cylinder and on the control cylinder (10).

Actuate the control cylinder in the cab to "Luffing cylinder UP" and pull the luffing cylinder up a little.

Unpin the supports (2) and fold the brackets (1) for the luffing cylinder receptacle down on both sides.

Set up the luffing cylinder receptacle (11) on the rear of the vehicle and lock and secure with pin (12).

Turn the slewing platform in travel direction to the rear and lower the luffing cylinder to the receptacle (View "B").

Note: For travel without telescopic boom, see Travel conditions, chapter 3.02.

2. Installation

D A N G E R : Danger of falling!
For assembly and disassembly, the assembly personnel must be secured with suitable aids to prevent them from falling. If this is not observed, the assembly personnel can fall down and be fatally injured.
- Normally all assembly work from a height of 2 m on must be carried out with suitable aids (lifting platforms, scaffolding, ladders, auxiliary crane,etc.)! The height in which assembly / disassembly work must be carried out with aids depends on the national regulations. The national regulations must be strictly adhered to!
- If work cannot be carried out with such aids nor from the ground, then the assembly personnel must be secured with personal protective devices (for example safety belts) to prevent them from falling!

Prerequisites:
- The crane is properly supported and horizontally aligned.
- The counterweight is installed on the slewing platform, according to the load chart.
- The telescopic boom is fully telescoped in.
- The TY-brackets are installed and erected.
- The TN/TF-adapter is properly installed on the telescopic boom **or** the TN/TF-adapter is placed on the ground.
- The LICCON overload safety system is set according to the data in the load chart.

2.1 Install the eccentric

The eccentric (3) can be installed on the TN/TF-adapters (6) if:
- the TNTF-adapter (6) is installed on the telescopic boom
- the TN/TF-adapter (6) is placed on the ground.

The installation procedure of the eccentric (3) on the TN/TF-adapter (6) **and** on the TN/TF-adapter (5) is always the same.

- Release and unpin the pins (7) on point (A) on both sides.

D A N G E R : Danger of accidents due to uncontrolled oscillating of the support (1)!
As soon as the pins (7) are unpinned on point (A) , the support (1) can swing out uncontrollably when the eccentric (3) is raised.

For the description of tackle points, see paragraph 1.2 "tackle points".
- Attach an auxiliary crane on the tackle points .
- Lift the eccentric (3) with the auxiliary crane and guide into the pin points on the TN/TF-adapter (6) .
- Pin the eccentric (3) with the TN/TF adapter (6) : Insert the pins (7) on all four pin points and secure with spring retainers.

When the eccentric (3) was installed on the TN/TF-adapter (6) laying on the ground, then the TN/TF-adapter (6) must be installed with installed eccentric (3) on the telescopic boom .

For the description of tackle points, see paragraph 1.2 "Tackle points".
- Attach an auxiliary crane on the tackle points .
- Lift the eccentric (3) and the TN/TF-adapter (6) with the auxiliary crane and guide into the pin points on the telescopic boom .
- Pin the TN/TF adapter (6) with the telescopic boom : See chapter 5.03.

2.12.1 Pretension angle for 0° lattice jib angle, TY3EF-operation - 84 m

Boom length [m] (Extension condition of telescoping sections) [%]	**Pretension angle** **Telescopic boom** **α** [°]	**TY-bracket angle** **β** [°]	**Hook block weight** [t]
T - 68.9 (92 /92 /92/92/46/46) + A-2,2 + F-6	57°	42°	2,6
T - 68.9 (92 /92 /92/92/46/46) + A-2,2 + F-14	62°	42°	2,6
T - 68.9 (92 /92 /92/92/46/46) + A-2,2 + F-21	65°	42°	2,6
T - 68.9 (92 /92 /92/92/46/46) + A-2,2 + F-28	67°	42°	1,4
T - 68.9 (92 /92 /92/92/46/46) + A-2,2 + F-35	70°	42°	1,4
T - 68.9 (92 /92 /92/92/46/46) + A-2,2 + F-42	75°	42°	1,4
T - 68.9 (92 /92 /92/92/46/46) + A-2,2 + F-49	75°	42°	1,4
T - 68.9 (92 /92 /92/92/46/46) + A-2,2 + F-56	77°	42°	0,7

2.12.1 Pretension angle for 0° lattice jib angle, TY3EF- operation - 84 m

Boom length [m] (Extension condition of telescoping sections) [%]	**Pretension angle** **Telescopic boom** **α** [°]	**TY-bracket angle** **β** [°]	**Hook block weight** [t]
T - 78.3 (92 /92 /92/92/92/92) + A-2,2 + F-6	57°	42°	1,4
T - 78.3 (92 /92 /92/92/92/92) + A-2,2 + F-14	62°	42°	1,4
T - 78.3 (92 /92 /92/92/92/92) + A-2,2 + F-21	65°	42°	1,4
T - 78.3 (92 /92 /92/92/92/92) + A-2,2 + F-28	67°	42°	1,4
T - 78.3 (92 /92 /92/92/92/92) + A-2,2 + F-35	70°	42°	1,4
T - 78.3 (92 /92 /92/92/92/92) + A-2,2 + F-42	75°	42°	1,4

4.3 Unreeve the hoist cable

Make sure that the fixed lattice jib is placed down.

- Unreeve the hoist cable as described in chapter 5.03.
- Remove the counterpulleys (12) : release and unpin the pin (11) on both sides.
- Remove the hoist cable from the cable guide pulley (10) .
- Install the counterpulleys (12) : pin and secure the pin (11) on both sides.

4.4 Remove the fixed lattice jib

For the removal of the mechanically adjustable fixed lattice jib, see chapter 5.03.
For the removal of the hydraulically adjustable fixed lattice jib, see chapter 5.09.

4.5 Remove the guy ropes on the eccentric

- Attach the auxiliary crane on brackets (8) .
- Tension the tackle cables tightly to secure the brackets (8) and prevent them from falling down.
- Unpin the brackets (8) on the guy points of the eccentric (3) : release and unpin the pin (9)
- Spool up the guy ropes and pin the brackets on the TY-brackets.
  See chapter 5.05.

3. Fold installation head to the side of the pivot section of the telescopic boom

Prerequisite;
The telescopic boom is fully telescoped in.
(place telescope with locking pin on 0% bores)
Installation head is in working position, installed on telescopic section II or III.
The telescopic boom is luffed down into 0° position.

D A N G E R : Make sure that there are no persons or objects within the swing range and the folding range of the installation head. During the swing procedure, the installation head must be held tightly with tackle cables, to prevent it from swinging out by itself. There is a danger of accidents!

3.1 From telescopic section II (Fig. 6 to 6.5)

- Attach the tackle cable on the tackle point (25).
- Unpin pin (18) at "F".
- Swing the installation head (1) with the tackle cable at "A" by 180°.
- Remove the pin (18) at "B" on top and bottom.

D A N G E R : The pins (18) at "B" may only be unpinned if the pins (16) are properly inserted and secured at "C" on top and bottom. There is a danger of accidents!

- Swing the installation head (1) and folding bracket (2) at "C" with the aid of the tackle cable by 90°.
- Insert pin (16) at "H" and "G" on top and bottom and secure with spring retainer (17).
- Unpin pin (16) at "C" on top and bottom.

G E F A H R : The pins (16) at "C" may only be unpinned if the pins (16) are properly inserted and secured at "H" and "G" on top and bottom. There is a danger of accidents!

- Swing the folding bracket at "A" by110°.
- Lock the folding pulley with pin (27) and secure.
- Remove the tackle cable.

3.1.1 Electrical connections (Fig. 6.1)

- Unplug the plug -X551 (cable W551) on the terminal box -X17B.
- Unplug the plug for the wind speed sensor and the beacon.

* Optional

1.2 Engine dependent heater

The driver's cab can be heated via the engine coolant.

Hinweis: After turning the ignition on, the heater is set as it was before the ignition had been turned off, with the exception of the fan, it is reset to stage "0" (OFF).

- The individual adjustment of the engine dependent heater can be made via the control elements on the keyboard unit, (see paragraph 1.1)

1.3 Engine independent auxiliary heater * (WEBASTO, Thermo 90 S)

The engine independent heater is used to heat the driver's cab when the engine is at a standstill, and also serves as an added heater in extremely low ambient temperatures, when the engine dependent heater is not sufficient.

Note: Please refer to the separately issued, more detailed manufacturer's operation manual for description of the auxiliary heater.

D A N G E R : **Due to danger of poisoning and suffocation, do not operate the heater in closed areas, such as garages or workshops, even with a timer* or Telestart *,!**
Due to DANGER OF EXPLOSION, the heater must be turned off in gas stations or refueling stations!
Where formation of combustible fumes or dust might occur (such as near fuel, coal, saw dust, grain storage areas or similar),the heater must be turned off due to DANGER OF EXPLOSION!

- The driver's cab can be heated via the engine independent auxiliary heater via the control elements of the keyboard unit (see paragraph 1.1)

Putting the heater into service

- Turn on the auxiliary heater via button (144), the function indicator in the button (144) lights up. The indicator light (180) in the indicator unit lights up.

Note: When turning the auxiliary heater on, the blower (fan) is automatically set to stage"1", to prevent the auxiliary heater from overheating.

Shut off the auxiliary heater

- Press the button (144), the function check in the button turns off.
  The indicator light in the button (144) turns off.
  The indicator light (180) in the indicator unit turns off.

Note: If the auxiliary heater runs in after-run mode, then the indicator light (180) in the indicator unit does **not** turn off. The keyboard unit remains on, even if the ignition key is pulled. When the after-run period is over, the indicator light turns off, the keyboard unit turns off automatically.

C A U T I O N : **The battery master switch may not be turned off until the heater has completed the after run period !**

1.3.1 Digital clock (timer) with thermostat *

- Set the desired turn on time, temperature and heater duration on the digital clock (29).

Note: Please refer to the separately issued, more detailed manufacturer's operating manual.

*Optional

2.4 Engine independent auxiliary heater * with engine preheating; WEBASTO, DBW2020
(for ambient temperatures to -40° C)
In extremely low temperatures, to facilitate the starting procedure and to provide sufficient lubrication, the engine must be preheated (tuyere stock heater, heater fuel filter, injection pump). This is done via a Diesel fuel operated auxiliary heater (DBW 2020). The heater can be turned on / off with timer (364).

Note: See separate Operation manual (WEBASTO DBW 2020) , operation with timer.

Note: During every engine start, the injection pump is also preheated, if the cab heater is at least on stage 1 and the engine is turned on without auxiliary heater.

C A U T I O N : All components must be filled with service fluids for winter operation, as specified on the lubrication chart.

- Turn on the battery master switch.
- Depending on the ambient temperature, turn on the auxiliary heater on the timer (364) up to 75 minutes before starting the engine.
- 10 to 25 seconds after turning it on (prerun), the auxiliary heater starts, the auxiliary heater runs in automatic regulation.

- Turn off the auxiliary heater after completion of the preheat time with timer (364).

Note: The auxiliary heater runs after up to 150 seconds.

*Optional

1.2.2 LICCON System Bus 4 (LSB 4) is defective

Possible cause
- Input circuit board has no connection with CPU.
- Fuse supply bus circuit board is defective.
- Interface LSB power source or CPU is interrupted.
- Electrical connection of cable drum -N1 to control for telescopic section lock, tong lock is interrupted.

Reaction of crane
Neither automatic nor manual telescoping is possible.

Error recognition in operating view
- Number value in symbol element "Maximum load carrying capacity" is "0.0".
- Number value in symbol element "Current load carrying capacity" is incorrect.

Error recognition in telescoping view
- Telescopic section is not pinned.
- Telescoping cylinder is not locked.

Error recognition in LSB-overview
(LICCON test system, CPU 3)
- Sensor, inductive sensors for telescoping are not available on bus, even though they must be present **"O"**.
- Sensor is present, but a configuration error has been recognized **"X"**.

Telescoping in
- Fix possible cause of error , otherwise see paragraph 1.2.1.1, emergency operation "Telescoping with keyed switch **-S1"**.

1.2.9 Valves to unpin / pin telescopic sections, telescoping cylinder lock (tong) can no longer be actuated

See wiring plan hydraulics telescopic boom
-Y16 Pressure supply telescopic lock / Telescoping cylinder lock
-Y17 Pin / unpin telescopic sections, telescoping cylinder lock

Possible causes
- The valves are mechanically defective.
- The electrical connection of cable drum -N1 to control for telescopic pinning, telescoping cylinder lock is interrupted (see paragraph 1.2.7).
- The valves cannot be supplied with power.

Telescoping in
Pinning of telescopic sections or locking of telescoping cylinder (tong) must be made with ball cocks and emergency hydraulic hoses.

1.2.9.1 Emergency operation with ball cocks
Before the emergency operation with ball cocks, the valve -Y17 must be bypassed.

- In the control box, unplug plug -X27 .
- Plug in test adapter (fig. 3) in socket -X27 .
- Plug in plug -X27 in test adapter .
- Remove terminal No. 1 on the test adapter, then valve - Y17 is no longer energized.

Prerequisites for emergency control with ball cocks
The crane engine is running.
Pumps 5 to 7 for individual pressure stages are functioning.
Telescoping cylinder can be telescoped in / out with master switch.
Mechanics of telescopic pinning, telescoping cylinder lock is functioning.

D A N G E R : The telescoping in movement of the telescopic boom must be constantly monitored by a guide, who is in visual contact with the crane operator.

When pinning / unpinning the telescopic sections, and / or the telescoping cylinder, each step must be carefully pondered before it is carried out.

Each telescopic section must be pinned with the next telescopic section.

- Press the switch (406) for pressure supply in the crane operator's cab.

- Turn on switch **-S1** (emergency operation telescoping) in the control box.

C A U T I O N : See paragraph 1.2.1.1 emergency control "Telescoping with keyed switch - S1".

- In the "telescoping" program, switch over to manual telescoping.

3.4 Interpretation of extension conditon of sliding arm monitor

The sliding arm length monitor measures the length of the individual sliding arms and checks if they are within the given permissible range. If at least one sliding arm is not in that range, then an error message is issued in the operating view, support view or telescoping view.
If all sliding arms are extended to permissible but different lengths, then that sliding arm , which has the smallest number will be taken as a basis for the selection of the load chart . The numbering sequence corresponds to the sequence of the support base, as sshown int he set up program, if the **F5** key is pressed several times.
The graphic shows which support is permitted at which extension condition, when selecting the load chart. The last case shows a situation where a sliding arm is between two permissible extension conditions.

3.5 Procedure in case of an error

Generally it must be differentiated between an operating error by the crane operator or a problem due to a total sensor failure or an erroneous sensor function.
If a sensor fails competely, then the monitor takes a length which corresponds to the retracted condition for monitoring for this sliding arm . Automatically only one chart with retracted supports can be selected. However ,this can lead to the fact that no chart can be selected in operating modes, such as **"TF"** operation, where the crane cannot even be operated with retracted supports.
If a sensor brings a signal, which is within permissible test range , but is still wrong, then the retracted condition can be simulated by pulling the wrong sensor input. An incorrect length data also can occur if the length sensor cable of a sliding arm got entangled in the sliding arm box.

C A U T I O N : If a sensor fails altogether or if the retracted conditon is simulated by pulling the sensor, than no sliding arm may be between two pinable positions, since that can lead to dangerous situations, even for loads for retracted condition . On "reduced" and "wide" support points, the sliding arms must always be secured by inserting the pins!

Note: see Crane operating instructions chapter 7.00 **part 2**!

Operating instructions

These operating instructions are intended to put you in a position to operate the crane safely and utilize the reliable usage options that it provides. The instructions also provide information about the function of important components and systems.
Certain expressions are used in these operating instructions. In order to avoid misunderstandings, the same expressions should always be used.
These operating instructions have been translated to be best of one's knowledge. Liebherr-Werk Ehingen GmbH assumes no liability for translation errors. The German version of these operating instructions is solely applicable for factual accuracy. If you find any errors or if any misunderstandings arise when reading these operating instructions, please contact Liebherr-Werk Ehingen GmbH immediately.

DANGER
Risk of fatal injury if operated incorrectly!
Incorrect operation of the crane can result in death or serious injuries!
▶ Only authorised and trained expert personnel are permitted to work on the crane!

The operating instructions and on-site regulations and specifications (such as accident prevention regulations) must be followed.
The use of these operating instructions:
– **makes it easier** to become familiar with the crane
– **avoids** problems due to improper operation

Observing these operating instructions:
– **increases** reliability in use
– **extends** the service life of your crane
– **reduces** repair costs and downtime

Always keep these operating instructions handy in the driver's or crane cab.
The operating manual is part of the crane!
Only operate the crane if you are well familiarized with the equipment, and always follow these operating instructions.

Note
▶ If you have received additional information about the crane from us, such as technical information bulletins, instructions and/or supplements to these operating instructions, then this information must also be followed and kept with the operating instructions.

If there is anything in the operating instructions or the individual chapters that you do not understand, please contact us before starting the relevant work.

All accident prevention guidelines, operating instructions, etc. are based on destined use of the crane.

Destined use

The destined use of the crane consists solely in vertical lifting and lowering of free and non-adhered loads, whose weight and center of gravity are known.
To do so, a hook or hook block approved by Liebherr must be reeved on the hoist rope and it may only be operated within the permissible crane configurations.
Driving with the crane, with or without an attached load is only permissible if a corresponding driving or load chart is available. The crane configurations intended for it and the safety conditions must be observed according to the corresponding operating instructions.
Any other use or any other exceeding utilization is **not** destined use.
Part of destined use is also adherence of required safety regulations, conditions, preconditions, crane configurations and working steps as noted in the crane documentation (operating instructions, load chart, job planner).
The manufacturer is **not** liable for damages, which are caused by non-destined use or improper use of the crane. Any associated risk it is carried solely by the owner, the operator and the user of the crane.

1 Traffic regulations

The crane is approved for road travel when used in accordance with regional traffic regulations.
The crane must be made to comply with the relevant local traffic regulations, before it is driven on public streets, roads and other places.
The weights, axle loads and dimensions specified in the permits must be maintained and shall not be exceeded by additionally loading the crane.
The technically feasible axle loads may be different from those permitted by local road traffic regulations.
In countries where EEC specifications apply, axle loads greater than 12 t are not permitted for street traffic.
All consequences for driving on roads with an axle load that exceeds 12 t rest with the crane operator.

DANGER
Exceeding the axle load and total weight increases the risk of accident!
Any increase in axle load and total weight reduces braking performance in direct proportion to the excess weight.
Brake lining wear is greater and risk of brake overheating in higher. This condition exceeds the specifications of the steering mechanism, operating and parking brakes and retarder!
It shortens the life of all components subjected to the increased axle load; e.g. brakes, tires, rims and axles, as well as the entire drive, suspension and steering assemblies.
▶ Do not exceed the specified axle load or total weight under any circumstances!

A hook block may only be transported at the front if:
– this is permitted by the current driving condition of the crane (see Chapter 3.04)
– it has been reeved at least four times
– and lashed using the eye provided on the front towing coupling

DANGER
Risk of accident if driver's field of vision is blocked!
▶ Do not allow the hook block to impair the driver's field of vision when driving the crane on public roads!

1.1 Boom nose*

If a boom nose is attached, it must be moved from the operating position to the transport position to prevent field of vision impairment and must be secured in this position using bolts and safety springs.

1.2 National traffic regulations

Be sure to comply with all valid **national traffic regulations** when driving the crane!
The cab may not be occupied by passengers while driving the crane.

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7 Supporting

DANGER
The crane can topple over!
When actuating the supports with attached load and / or at loaded derrick ballast guying, the incline and the force conditions of the entire boom system change!
There is **no** shut off by the LICCON overload system!
The crane can topple over!
Personnel can be severely injured or killed!
- ▶ When a load is suspended, it is prohibited to actuate the support!
- ▶ When the derrick ballast guying is loaded, it is prohibited to actuate the support!

It is absolutely essential that the crane be supported exactly in accordance with the load charts to ensure safe operation.
The match of the sliding beams placement surfaces must be observed to ensure proper force transfer between the sliding beams.
The crane may only be supported in these extension conditions.

DANGER
The crane can topple over!
Intermediate positions between the support bases may not be supported, because the force transfer is only possible via the side placement surfaces and in intermediate positions, due to the lack of placement surfaces, an incorrect force transmission can occur on the upper chord.
- ▶ Pin sliding beams to support base according to the load chart!
- ▶ Fully pin in and secure the pins!

All 4 sliding beams and support cylinders must be extended according to the data in the load chart, also those on the counterweight side.
If only the load side sliding beams are extended, the crane can tip over when turning or setting down the load.

WARNING
Risk of tipping the crane due to incorrectly extending the sliding beams!
The load suspended on the hook causes tension and deformation of the hoist rope and telescopic boom, the same applies to lattice jibs and guy ropes. If the load is dropped from the tackle cables or if the tackle or hoist rope breaks in this situation, a sudden relief occurs. The boom snaps back quickly. This can cause the crane to topple over.
Despite previous assumption, it might become necessary to swing the load to the opposite side. This can cause the crane to topple over.
When turning from the vehicle longitudinal direction, the crane can topple over due to the boom or counterweight momentum.
- ▶ It is imperative that all 4 sliding beams and support cylinders be extended according to the data in the load chart!

7.1 Crane alignment

In addition to the proper foundation for the supports, the horizontal alignment of the crane is of utmost importance for safe crane operation.

17 Working in the vicinity of transmitters

Strong electromagnetic fields are likely to be present if the construction site is close to a transmitter. Electromagnetic fields can expose people and objects to direct and indirect risks, such as:

– Effect on human organs due to temperature increase.
– Danger of burns or inflammation due to temperature increase.
– Spark or electric arc formation.

DANGER

Risk due to electromagnetic fields!

▶ Before operating a crane in the vicinity of transmitters, be sure to consult with LIEBHERR!
▶ Also consult a high frequency specialist!

High frequency (HF) radiation from a transmitter requires supplementary work safety protection and special environmental specifications for crane operators and personnel:

1.) Each crane must be “fully” grounded. Check visually or with a simple tester to ensure that ladder, cab and cable pulleys are grounded.
2.) All personnel working on the crane or with large metal objects must protect themselves from burns by wearing non-conductive synthetic gloves and suitable clothing while working.
3.) There is no need to panic if you feel your hand warm up. Always work under the assumption that the respective workpiece, structural steel member or support is “hot”.
4.) The temperature of objects affected by high frequency radiation depends on their “size”. Cranes, carriers and coverings, for example, are “hotter”.
5.) Contact with other crane loads is not permitted when operating the crane (arcing). Since defects caused by burns considerably reduce cable carrying capacity, any such occurrences must be reported immediately to the machinery supervisor so that the cables can be inspected.
6.) An insulator **1** is required at all times between the crane load hook and tackle. It is strictly prohibited to remove this insulator **1**.
7.) Do not touch the cables above the insulator **1**.
8.) Loads that are attached to the crane may not be touched by any unprotected parts of the body after the load has been lifted or set down.
9.) Do not work with a bare upper torso or in short pants, this is prohibited.
10.) To minimize absorption of high-frequency radiation, larger loads should be transported horizontally if possible.
11.) Loads must be grounded, or additional insulation used (rubber material between the object and gloves) when manual work is required.
12.) Use a suitable measuring instrument to check the “temperature” of the workpiece.
If, for example 500 V can be measured on a tool at a distance of 1 cm to - 2 cm, then the tool may not be touched with bare hands.
The greater the distance, the higher is the voltage on the object:
At a distance of 10 cm, the voltage is approx. 600 V, at a distance of 30 cm, the voltage is approx. 2000 V.
13.) To avoid secondary accidents, use a safety belt when working on structures that are high off the ground.
14.) Handling explosive matter (such as refuelling) may only be done at least 6 m away from the place where sparks could form due to handling of larger metal parts. Use only conductive rubber hoses to refuel.
15.) Any accidents and unexpected events must immediately be reported to the local construction supervisor and the safety engineer.

3 Command / prohibition signs

3.1 Configuration of command signs

The shape is round and the base is blue.
The surface of the sign is bordered by a bright edge.

Note

- ▶ Command signs are safety signs, which dictate a certain behavior.
- ▶ For that reason, all command signs on the crane must be complete and always legible.

3.2 Configuration of prohibition signs

The shape is a round, the border is red, and the symbol is black. A red crossbar is drawn through the symbol. The base is white.

Note

- ▶ Prohibition signs are safety signs, which prohibit a behavior, which can result in danger.
- ▶ For that reason, all prohibition signs on the crane must be complete and always legible.

3.3 Command / prohibition signs on the crane

The following command / prohibition signs are installed on the crane:

– Prohibition sign **20**, “Access for unauthorized personnel prohibited”.
– Command sign **22**, “Speed”, valid only for certain countries*.

3 Taking on a load

The crane must always be operated in such a way that its load-bearing parts are not destroyed or damaged and its stability is ensured.

3.1 Lifting the load

WARNING
Danger of crushing for people in the load zone!
If personnel is located between the load to be lifted and a possible interfering edge (such as a wall of a building or similar) when the load is lifted, personnel can be severely injured or killed!
- ▶ The crane operator must ensure, before lifting the load, that there are no persons within the danger zone!
- ▶ It is forbidden to stand in the danger zone!
- ▶ Exercise extreme caution when lifting a load!

WARNING
Crane can topple over!
If an attempt to lift a load above the hoist gear causes the LICCON overload protection to turn off, then the load must not be lifted by raising the boom. This leads to overloading and toppling of the crane!
Personnel can be severely injured or killed!
- ▶ Do not lift the load by raising the boom from the ground!

Note
When using an auxiliary winch* (installation or reeving winch), observe the following:
- ▶ Only use the auxiliary winch (installation or reeving winch) for installation and not to lift loads!
- ▶ Lifting of loads with the auxiliary winch is prohibited!

If the rope is manually attached to the load to be raised by an assistant:
- – Make sure that the assistant's hands are not crushed between the load and the rope by the tautly pulled ropes.
- – Make sure that the assistant's body parts (hands, legs etc.) are not crushed by a pendulum movement of the load during lifting.

3.2 Diagonal pulling

WARNING
Crane can topple over!
Diagonal pulling can destroy the crane or cause it to topple over!
Personnel can be severely injured or killed!
- ▶ The hook block must always be attached vertically over the center of gravity of the load to be lifted!
- ▶ Diagonal pulling is not permitted!

The crane is designed only to lift loads vertically. During diagonal pulling, regardless of whether this is done in the same direction as the boom or diagonally, horizontal forces are generated in addition to the vertical ones, for which the boom is not designed.

5.00 Equipment

10 Assembly / disassembly

WARNING
Risk of fatal injury due to incorrect assembly or disassembly!
The assembly / disassembly of components may never be performed by untrained personnel.
Incorrect assembly / disassembly can result in death or severe injury!
- ▶ Assembly and disassembly may only be carried out by authorized trained experts!

Note
- ▶ For assembly / disassembly of individual components, also refer to the chapters relating to those components!
- ▶ Only use the auxiliary winch (assembly or reeving winch) for assembly and not to lift loads!
- ▶ Lifting of loads with the auxiliary winch is prohibited!

Normal assembly / disassembly procedures require all separately transported components to be transported close to the ground using appropriate auxiliary cranes and tackle. They must be safely (correctly) connected to the crane.
Suspended loads such as counterweights, lattice sections or auxiliary booms etc. must be placed on the ground or on a frame or other suitable load bearing device before being approached by assembly personnel.

WARNING
Danger of impact and crushing!
There is a risk of impact and crushing when standing in the vicinity of suspended loads moving sideways.
- ▶ During assembly / disassembly no one may be in the dangerous area around or even underneath the suspended load before the load has been secured!

WARNING
Risk of falling!
During assembly and disassembly, inspection and maintenance work, personnel must be secured with appropriate antifall guards to prevent them from falling. If this is not observed, assembly personnel could fall and suffer life-threatening or fatal injuries.
- ▶ All assembly work must be carried out using suitable aids (ladders, lifting platforms, scaffolding, auxiliary crane, etc.)!
- ▶ If work cannot be carried out on the ground or using such aids, then assembly personnel must be secured with the personal antifall guard system (see Crane operating instructions, chapter 2.04) to protect against falling! The personal antifall guard system must be attached in the corresponding attachment points on the crane (see Crane operating instructions, chapter 2.06).
- ▶ If railings are present for the crane, then they must be brought into the corresponding position and secured for assembly / disassembly, inspection and maintenance work.
- ▶ Only step on aids and antifall guards with clean shoes!
- ▶ Keep aids and antifall guards clean and free from snow and ice!
- ▶ It is prohibited to walk on the telescopic or auxiliary booms!

10.2.5 Assembly of lattice sections on self-supporting auxiliary booms without using an auxiliary crane

The illustrations serve as examples. The illustrations may differ depending on the crane.

WARNING
Risk of fatal injury when assembling auxiliary booms!
If the pins are not pinned in the given sequence, then lattice sections may suddenly fold down or even fall down. This can result in life-threatening injuries to personnel.
▶ Pins must be pinned in the order specified!

For cranes with hydraulic angle adjustment and self-supporting auxiliary boom, the assembly / disassembly of additional lattice sections may be performed using the crane itself.
In order to do so, proceed as follows.
▶ Assemble the lattice sections to the required length.
▶ Pin in and secure pins at both sides (level **A**) at point **1**, illustration 1.
▶ Luff the auxiliary boom up until the pins can be pinned at point **2**, illustration 2.
▶ Pin in and secure pins at both sides (level **B**) at point **2**, illustration 2.

10.4 Bypass for assembly and disassembly

Note

▶ The assembly key button is only installed on certain cranes.

WARNING

High risk of injury when operating crane with assembly key button enabled!

Operating the assembly key button bypasses the hoist limit switch and the overload protection!

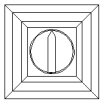
In the event of deliberate improper use, the crane could collapse, the boom can break off or the crane can topple over!

Personnel can be killed!

This could result in high property damage!

- ▶ Only operate the assembly key button when performing assembly and disassembly tasks!
- ▶ All other usage of the assembly key button other than as described in the operating instructions is prohibited!
- ▶ The assembly key button may only be operated by persons, who are aware of the consequences of a bypass!
- ▶ Operating the crane with the assembly key button enabled is strictly prohibited!
- ▶ The assembly key button must be removed immediately and handed to an authorized person after carrying out any assembly and disassembly work!

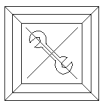
10.4.1 Crane with LICCON overload protection



▶ Actuate assembly key button.

Result:

– The LICCON overload protection is inactive.
– The indicator light in the button lights up.
– The assembly icon on the LICCON monitor blinks.
– An acoustic signal sounds.
– The red flashing beacon on the crane cab blinks.



▶ To turn the assembly key button off:
Turn off the assembly key button by pressing the button.

Result:

– The LICCON overload protection is active.
– The indicator light in the button turns off.
– The assembly icon on the LICCON monitor turns off.
– The acoustical signal turns off.
– The red flashing beacon on the crane cab turns off.

1 General

WARNING
Danger of fatal injury due to damaged mobile crane components!
If mobile crane components, which were damaged, for example due to maintenance errors, are not replaced immediately, personnel can be fatally injured!
- ▶ Maintain mobile crane components according to the data in the maintenance intervals, the maintenance guidelines and the lubrication chart!
- ▶ Replace damaged mobile crane components immediately!

NOTICE
Damage of mobile crane components!
If mobile crane components are not maintained according to the maintenance intervals and maintenance guidelines in the individual chapter, or if other lubricants are used than specified in the lubrication chart, the respective mobile crane components can be damaged and/or fail.
The warranty for the respective mobile crane components will be voided!
- ▶ Maintain mobile crane components according to the data in the maintenance intervals, the maintenance guidelines and the lubrication chart!

1.1 Liebherr Customer Service for you

Liebherr mobile cranes - whether truck-mounted, mobile or crawler cranes - are technically advanced products, which prove their worth daily even under tough conditions.
The high technical standards of these cranes provide functional security, resistance to failure and easy maintenance.
Liebherr is continuously developing the drive and control components. The combination of well proven units and modern manufacturing methods produces cranes that are safe to operate and easy to maintain.
Several hundred cranes are built every year for the international market, supported by international service.
Liebherr's “After Sales Service” plays an important role in ensuring the operational readiness and high availability of the cranes.
With Liebherr, service begins when the crane is handed over. Your crane operators will be professionally trained in line with their level of knowledge, and we devote much time to this.
We also train your workshop staff in all crane-specific matters, because we know that they can deal with more than just minor repairs themselves. Often there are specialists who can quickly and reliably carry out crane repairs.
We also have specialist service advisers who can help you to fix your on-site problems creatively. This contact by telephone saves time and money. In the event of problems, get in touch as soon as possible.
Our service technicians are also specialists with years of experience, and can be deployed from local support points. Naturally these experts have specialized knowledge and special tools.
But before you call on these people, it is worth making full use of the facilities for getting advice mentioned above.

Note
Customers claims for warranties and refunds!
Only original Liebherr replacement parts have been tested for operational use in cranes, and they can be installed without risking safety.
- ▶ The buyer only has a claim to warranties and possible credit if only Original Liebherr replacement parts, Liebherr service items and lubricants are used for Liebherr mobile cranes.

	First maintenance	Regular maintenance, every			Minimum maintenance	Checks	
	After	250 h 5000 km	500 h 10000 km	1000 h 20000 km	Annually	Daily	Weekly
Check fuel preliminary filter, drain off water if necessary		Every 50 h					
Replace fuel preliminary filter				X			
Tires							
Check for external damage							X
Check the tire pressure							X
Check tread wear and depth (observe governmental regulations)						X	
Ensure that wheel nuts are tight, re-tighten if necessary	100 km	X					
Brake system							
Check brake system					X		
Check brake lining thickness		X					
Adjust brakes if necessary, replace linings if required		X					
Check the brake discs		X					
Check the brake drums		X					
Check operation of parking brake and service brake						X	
Eddy current brake							
Check mechanical and electrical parts (follow manufacturer instructions)	5000 km		X				
Air pressure system							
Check for leaks							X
Check operating pressure of brake system						X	
Check cut-off pressure						X	
Drain air pressure tank					X		

	First maintenance	Regular maintenance, every				Minimum maintenance	Checks	
	After	125 h	250 h	500 h	1500 h	Annually	Daily	Weekly
Change the oil on the guy winch						Every 4 years		
Derrick ballast								
Check frame, suspension and guide section for distortion and cracks						X		
Check wheels for condition and tight seating						X		

[1] every 3 months if the crane is not moved.
[2] carry out a visual inspection before every startup in service.
[3] in hot climates twice a year.
[4] note chapter 7.05, Crane superstructure maintenance instructions.
[5] when necessary.
[6] during assembly.

2.4 Changing the oil on the torque converter coupling

Make sure that the following prerequisites are met:
- the parking brake is activated,
- the transmission is in neutral,
- the oil is hot and is thin.

Note
Important safety instructions!
- ▶ Do not drive against converter when stationary!
- ▶ Do not actuate the retarder at a standstill. The retarder must be turned off.

- ▶ Remove the oil dipstick **13**.
- ▶ Remove the oil drain plugs **5** and the torque converter discharge plug **11** and drain the oil.

Note
- ▶ The oil in the torque converter cannot be drained completely. The oil remaining in the torque converter is approx. 9 l. Depending on the version and location, a certain amount of oil, which cannot be drained, also remains in the connector lines.

- ▶ Clean the magnet on the oil drain plugs **5**.
- ▶ Reinstall the oil drain plugs **5** and torque converter discharge plug **11** with new seal ring and tighten.
- ▶ Add oil as specified on the lubrication chart on the oil filler tube **12** (approx. 20 l).
- ▶ Start the engine.
- ▶ With the engine running at low idle RPM, check the oil level constantly and add oil until the oil level on the dipstick **13** remains steadyly in the area of the 30 °C cold mark. This procedure can take several minutes until all lines and the cooler are filled.

NOTICE
Danger of damage!
- ▶ If too much oil has been added, then it must be drained!

The oil should be at approx. 30 °C, allow oil to cool down if necessary.
- ▶ Check oil level at 30 °C cold mark with the engine at low idle.
- ▶ Add or drain oil, as necessary.

4.2 Diaphragm reservoirs of axle suspension / axle blocking system

Diaphragm reservoirs have been installed in the hydraulic system. The pretension pressures are specified in the hydraulic circuit diagram as well as on the individual diaphragm reservoirs. The pretension pressure must be measured separately in each diaphragm reservoir.

NOTICE
Risk of chassis damage!
If the outside temperature fluctuates considerably, e.g. after transport to extremely hot or cold countries or in countries with considerable differences between the summer and winter temperatures, the gas accumulator pressures may change. Inadequate gas pretension may cause the reservoir diaphragms to be overstressed. If the pretension is too high, the spring action in the axle suspension if no longer guaranteed.

▶ Check the gas accumulator pressures and correct if necessary.

Make sure that the following prerequisites are met:
– the axle suspension / axle blocking system is in the suspended position,
– the function control on button **130** is not illuminated.

▶ Lower vehicle down as far as possible using button **119**, button **120**, button **135**, button **136** and enter **143** until the oil has drained from the diaphragm reservoirs.

WARNING
Risk of explosion!
The pressure in the nitrogen cylinder must be less than the maximum permitted operating pressure of the reservoir or the pressure gauge. Otherwise install a pressure reducer between the cylinder and the filling device.

▶ Do not use air or oxygen to fill the diaphragm reservoir!

The pretension pressure in the hydraulic reservoirs may only be checked by an expert with appropriate training and equipment. In addition, the national regulations for pressurized container inspections must also be observed.

▶ Check the pretension pressure with a testing and filling device and correct if necessary.

▶ Press level button **129** and ENTER **143** until the function control on the level button **129** blinks.

Result:
– The vehicle is at the level setting for road driving.

4.3 Hydraulic hose lines

The hydraulic hoses must be checked according to ISO 9927-1 by an **experienced technician** or **expert mechanic**, as required, depending on the duration of use and the operating conditions, but at least once a year.

Experienced technicians are persons who:
– possess sufficient knowledge about cranes due to their professional background and experience,
– are familiar with the relevant settings to detect any abnormal operating situations,
– have undergone special training.

Expert mechanics are mechanics, who:
– are experienced in the design, construction or maintenance of cranes,
– possess sufficient knowledge about the relevant settings and standards,
– are fully equipped to perform inspections,
– are able to assess the safety of the crane,
– can decide which action needs to be taken to ensure the crane can continue to be operated safely.

9 Tilting the driver's cab

The driver's cab can be tilted forward for assembly or disassembly purposes to max. 24° .

9.1 Measures before the tilting

Before the driver's cab may be tilted forward over the front bearing, the following measures must be taken, depending on the version.

- ▶ Mark the position of drive shaft in relation to miter gear.
- ▶ Unscrew drive shaft from the miter gear to the steering gear on the flange.
- ▶ Remove the shock absorbers and stabilisers (if necessary) from rear wall of cab.

Pay attention to cables and hoses on underside of cab.

- ▶ Loosen the mounts, if necessary.

WARNING
Risk of accident if cab tilts forward in an uncontrolled manner!

- ▶ The maximum angle that the cab may be tilted forward is 24°.
- ▶ The cab must be secured in the tilted position using a proper base and secured with a support rod **1**.
- ▶ Screw and secure the support rod **1** with a nut M10 **2** and washer on top on the driver's cab.
- ▶ Bolt the support rod **1** on the bottom with pins **3** on the vehicle frame and secure with cotter pin **4**.

- ▶ Remove front bumper completely (depending on model) or loosen it, pull it out and tilt it downward.

9.2 Reinstall the drive shaft after tilting the cab

- ▶ Check the drive shaft for ease of movement and operation of joints and slider.
- ▶ If the drive shaft is damaged, replace it with a new drive shaft.
- ▶ Attach the drive shaft with assistance of markings that were made.

10 Electrical system - lighting

The maintenance of the electrical system is essentially limited to replacing defective fuses and bulbs and maintaining the batteries.

NOTICE
Risk of damage to electrical system!
Defective fuses must not be short-circuited using wire or the like.

- ▶ Always replace defective fuses with fuses for the same amperage.

10.1 Battery maintenance

DANGER
Risk of fatal injury!

- ▶ Always disconnect the batteries from the power circuits when working on the electrical system of the crane and during all welding work.

- ▶ Keep batteries dry and clean.
- ▶ Do not bring oil, grease, fuel or solvents into contact with the battery casting compound.
- ▶ Loosen dirty terminals, clean and grease them with an acid-free and acid-resistant grease.
- ▶ Check the acid levels in batteries at least once a year. In summer and in hot climate zones, check it at least twice a year.

2 Pump distributor gear, illustration 4

Please maintain utmost cleanliness during all work to prevent dirt from entering the gear system.

2.1 Checking the oil level

Ensure that the crane is horizontal.

- ▶ Remove and wipe off the dipstick **1**.
- ▶ Reinsert the dipstick **1** and pull it out again.

The oil level must be between the min. and max. marks on the dipstick **1**.

- ▶ Check the oil level.

NOTICE

Danger of gear damage!

If the oil level has dropped below the minimum mark, add engine oil as specified in the lubrication chart until the oil level is between the minimum and maximum marks!

- ▶ Add oil and check again!

- ▶ Reinsert the dipstick **1**.

2.2 Changing the oil

Make sure that the following prerequisites are met:

- the crane is horizontal,
- the transmission has warmed up.

- ▶ Remove the oil filler plug **2**.
- ▶ Remove the oil drain plug **3** and drain the oil.
- ▶ Install the oil drain plug **3** with new seal and tighten.
- ▶ Add oil as specified in the lubrication chart on the oil filler plug **2** until the oil level is between the min. and max. marks on the dipstick **1**.
- ▶ Install the oil filler plug **2** with new seal.
- ▶ Check the oil level.

4.7 Bleeding the central lubrication system

If the grease container **1** has been emptied, then it may be necessary to bleed the central lubrication system.

- ▶ Fill the grease container **1**.
- ▶ Unscrew the main line from the pump outlet **4**.
- ▶ Trigger additional lubricating pulses until there are no more air bubbles in the emerging grease at the pump outlet **4**.
- ▶ Reconnect the main line.
- ▶ Trigger an additional lubricating process.

4.8 Filling the lubrication lines

CAUTION
Risk of damage due to insufficient lubrication!
The lubrication lines must be refilled after any repair on components, which are lubricated with grease. If this is not observed, the component may run dry.

- ▶ Sufficient grease must be available in the grease lines after every repair on greased components.
- ▶ Observe utmost cleanliness when filling the grease lines!

- ▶ Add grease with an external grease pump via the grease fitting **3**.

or

- ■ With the ignition turned on, press the red button **7** on the engine protection housing of the pump.

9 Guy winches, illustration 5

Ensure that the following prerequisite is met:
– the guy winches are in horizontal position.

9.1 Checking the oil level

▶ Remove the level plugs **10**.

The oil level must reach the edge of the bore.
▶ Perform a visual inspection.

NOTICE
Danger of transmission damage!
▶ If the oil level has dropped, add the oil specified in the lubrication chart up to the overflow of the level plug **10**.

▶ Reinstall the level plugs **10** with new seals and tighten.

9.2 Oil change

▶ Remove the oil filler plug **9**.
▶ Remove the level plugs **10**.
▶ Remove the oil drain plug **11** and drain the oil into a suitable container.
▶ Install the oil drain plug **11** with new seal and tighten.
▶ Add oil on the oil filler plug **9** as specified in the lubrication chart until oil starts to overflow on the level plugs **10**.
▶ Install the oil filler plug **9** and level plugs **10** with new seals and tighten.

10 Air dryer, illustration 6

10.1 Replacing the granular cartridge

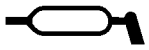
CAUTION
Risk of accident due to pretensioned granular cartridge!
The granular cartridge is under spring pretension!
▶ Caution when replacing the granular cartridge!

▶ Replace granular cartridge once per year.

11 Electrical system - lighting

Maintain electrical system and lighting in crane superstructure according to the maintenance data in chapter 7.04.

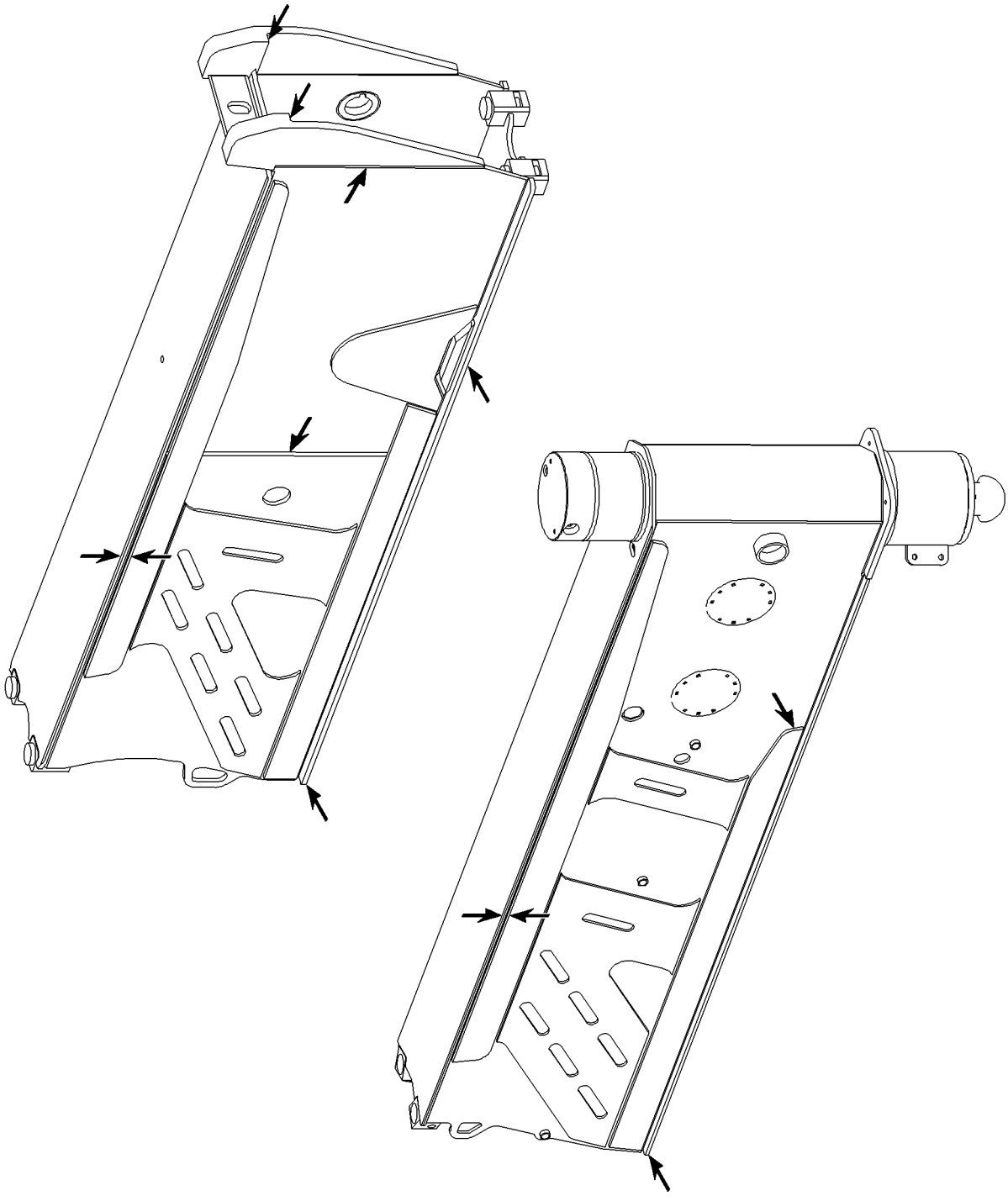
2.2 Lubrication schedule - Crane superstructure and boom



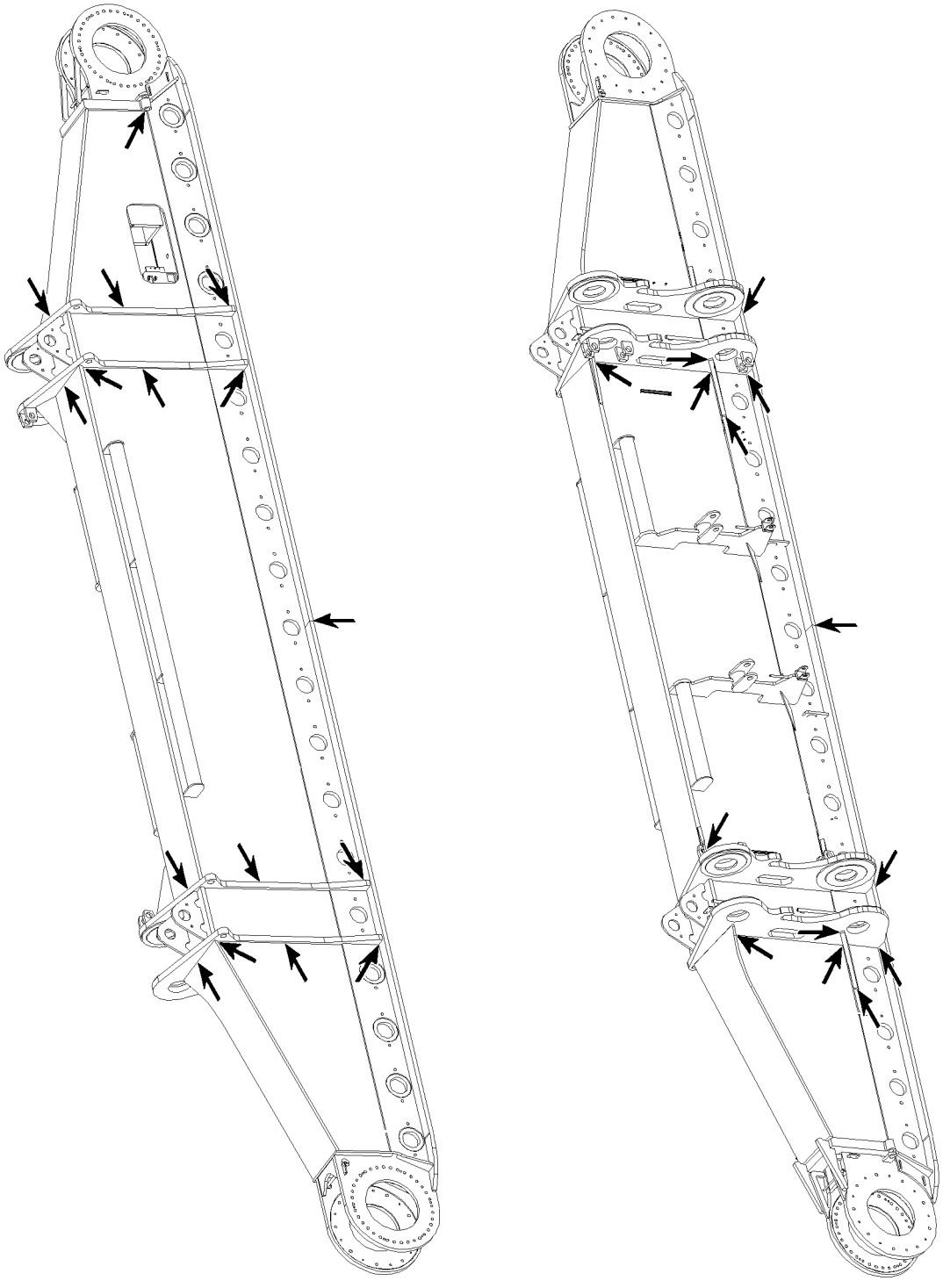
Note

▶ The lube points are marked with this icon.

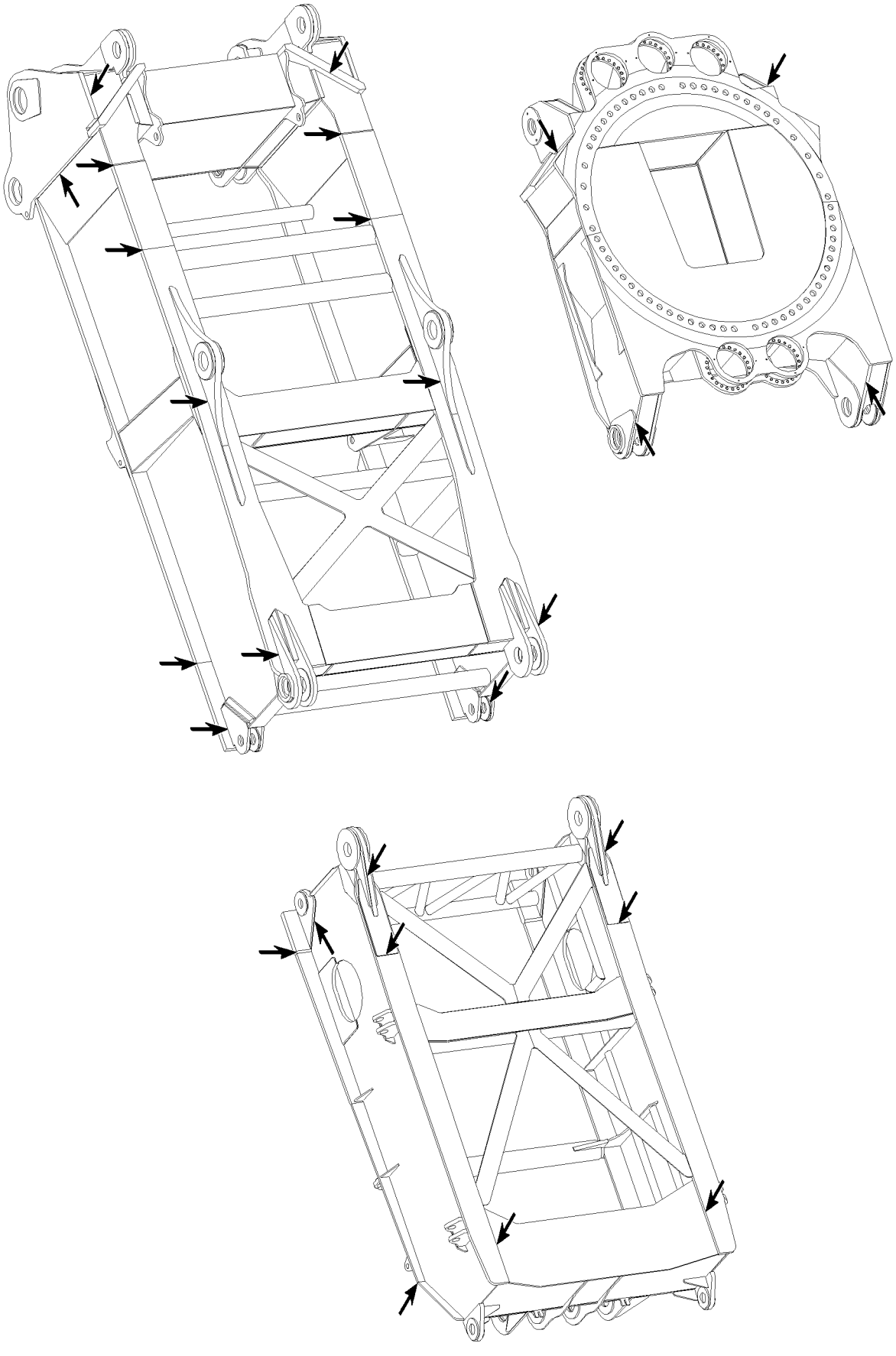
8.00 Inspections of cranes



B105717 *Example for sliding beam*



B105728 *Example for crawler carrier*



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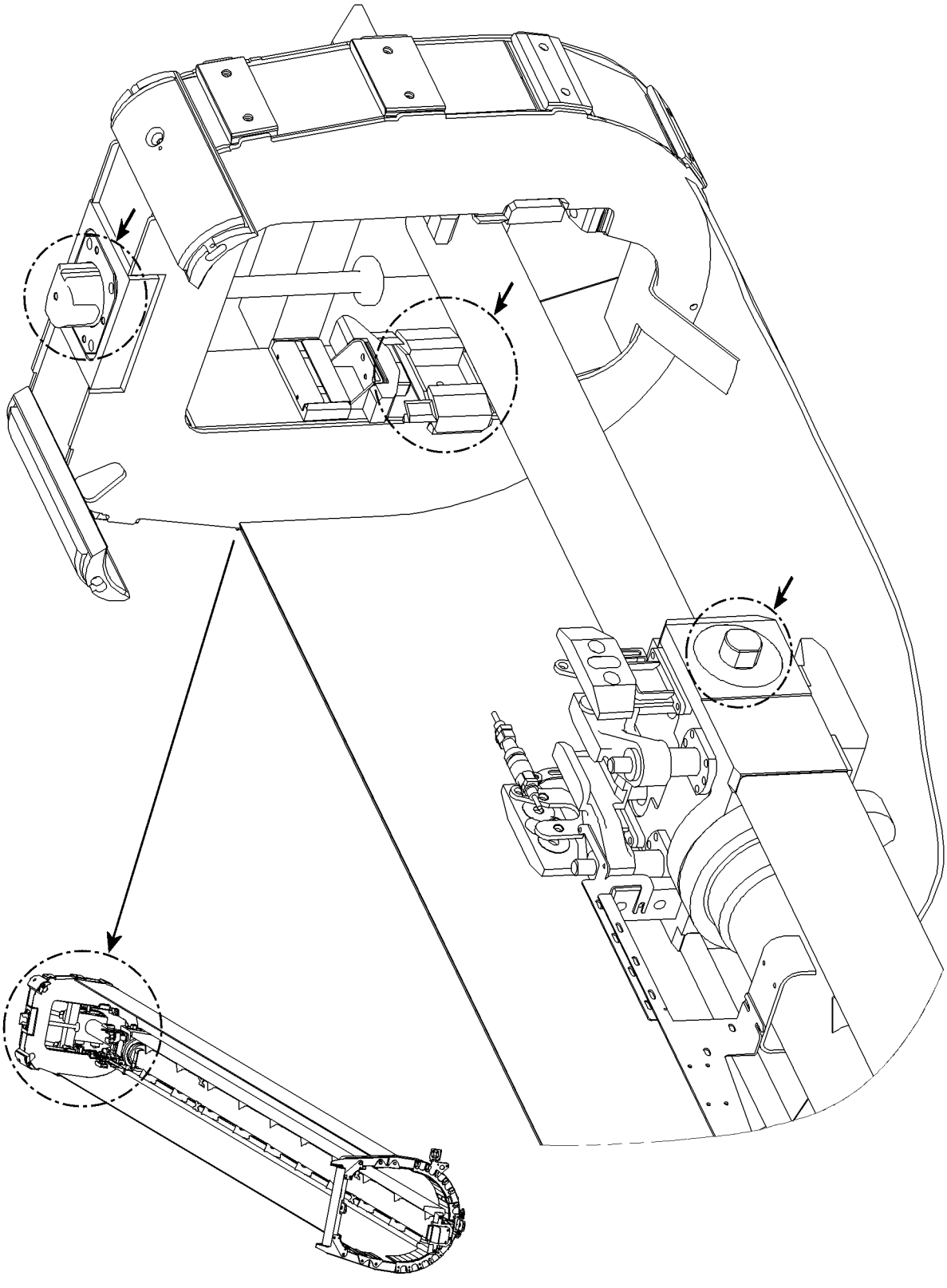
Example for turntable frame



B105891 *Example for push out mechanics telescopic boom*