

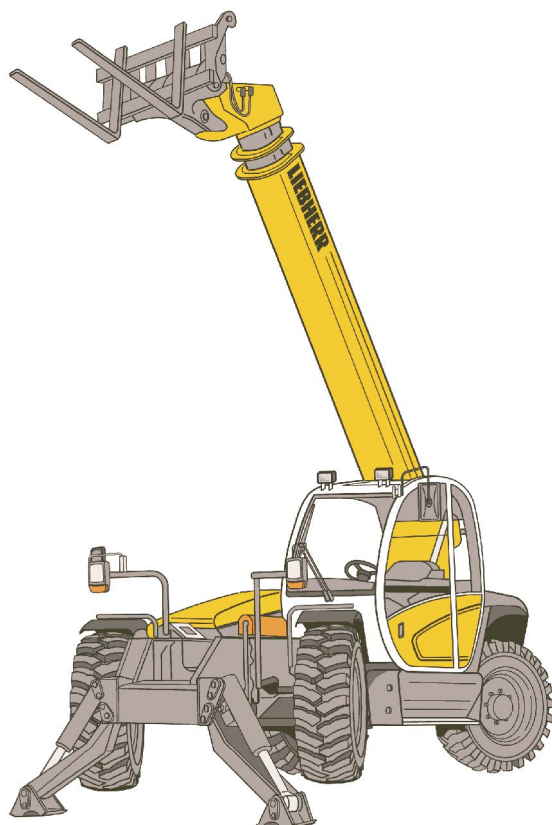
Service Manual

Property of Liebherr-Werk Telfs GmbH

Telescopic handler

SERIES **4**
Libtronic

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1 General

1.0.000 Sub group index - General

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1.1.000 Foreword and explanations

1 For information

This manual contains technical data, design and functional descriptions, work and adjustment instructions as well as numerous drawings, functional views and illustrations for the

LIEBHERR – Telescopic loader.

This manual should simplify competent customer service of our products. However, it does not replace expert and qualified user training and attendance of our factory training classes.

Generally valid basic information is not listed. Refer to separate documentation for operational and spare parts information.

The manual will be updated and expanded as necessary when changes occur in series.



Note!

This symbol is used in the manual for very important notes.

For all tasks on the machine, accident prevention guidelines and safety guidelines must be strictly observed.



Note!

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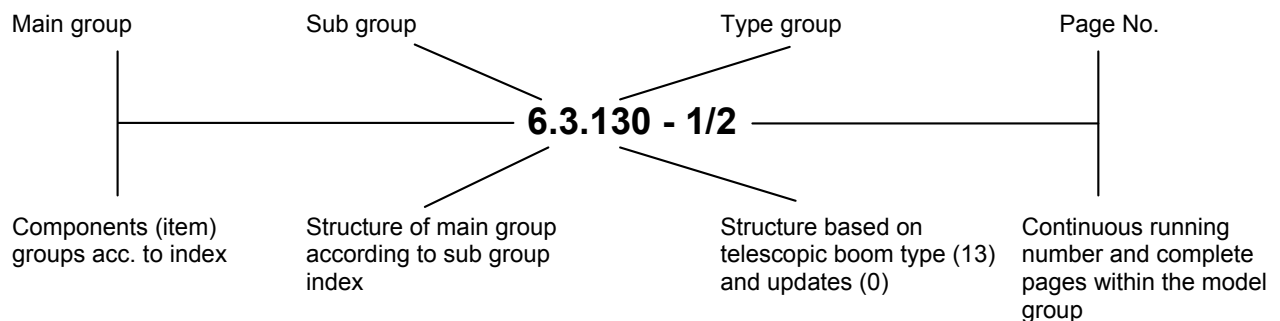
We reserve the right to make changes of technical details on the machine in comparison to the information and illustrations in this manual.

Written and published by

LIEBHERR-Werk Telfs GmbH., Technical Documentation Dept.

2 Explanation of layout

To make it easier to find certain information and to simplify filing of updates, the following structure was developed:



For the 3-digit type group number, the last number provides information regarding updates, whereby the two other numbers provide information about the type of machine,

for example 000 and no additional machine serial number limitation means that the document is valid for all TL machine.

for example 100/130 and no additional machine serial number limitation means that this document is valid for a **TL 10** meter boom / **TL 13** meter boom.

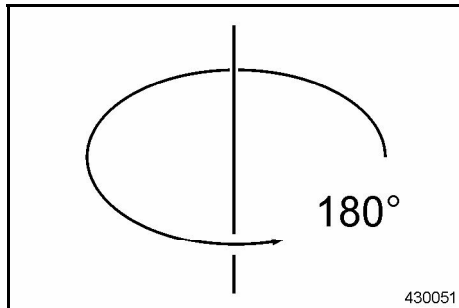
for example 001/101/131 is a supplement which is valid from a certain machine serial number.

Changes are issued with the same number, but with a later date. Updates have new numbers. If a page is valid only for a certain machine group, then this is noted in the header.

3 Itemization variations

- This symbol denotes a standard listing.
- This symbol means: “**The prerequisite must be met**”.
The maintenance personnel must first fulfill the described prerequisites, for example, to bring the machine in working position, to be able to carry out the steps described thereafter.
- ▶ This symbol denotes an **activity step**.
The maintenance personnel is to become active on this point and carry out the described activity.
- ▷ This symbol denotes a **result**.
The maintenance personal is alerted that there is a result after an activity step, for example after pressing the test button, the LED lights up.

4 General



This note shows that a detail view of an illustration is shown rotated by a given angle, as compared to the actual installation position (in this case 180°).

We hope that with the enclosed information we have taken yet another step to improve the service on the LIEBHERR telescopic handlers, crawler dozers, crawler loaders and pipe layers.

LIEBHERR-Werk Telfs GmbH.
Technical Documentation

1.2.000 Safety guidelines

1 Introduction

Prior to and during the performance of tests, inspections and repairs, the following safety guidelines must be observed:

- Any type of work may only be carried out by **qualified expert personnel** or under their guidance and supervision.

Qualified expert personnel are persons, who, based on their specialized training and experience, have sufficient knowledge in the area of telescopic handlers and the specific technology of our machines in particular and who are familiar with all applicable laws and general work protection regulations, accident prevention guidelines, regulations, guidelines and generally approved rules concerning technology so that they are able to evaluate if the earthmoving equipment is safe to operate and if the necessary work can be performed without endangering themselves or third persons.

- Always adhere to the adjustment values noted in the LIEBHERR documentation when performing adjustment work.
- At the delivery of a machine, the operating personnel must be trained using the current operating instructions. The safety guidelines noted in the instructions must be particularly observed.
- These **safety guidelines must also be observed** during inspection, adjustment or repair work. However, there are special repair and / or inspection work which require qualified personnel to follow another procedure than that noted in the safety guidelines. In such cases, qualified personnel or individuals performing the work under the supervision of such personnel should assure that additional safety precautions necessary to insure the safety of those involved in the repair and/ or third persons are taken. Such items of repair and/ or inspection work include, but are not limited to the following:
 - Opening the engine compartment doors while the engine running to carry out tests and / or adjustments.

In these cases, it should be ensured that the cab door is properly secured during the entire duration of the work to prevent it from closing unexpectedly and / or inadvertently. Care should be exercised to assure that there will be no inadvertent or unintended contact of any part of the body with any moving and / or heated components. Wear only tightly fitted clothing (no scarves, no tie, no wide sleeves, etc.).

Danger notes in this manual

In the description of work, which can cause dangers for man or machine, the required safety measures are described in this manual.

They are denoted with the following notes:



Danger!

Warns that certain working procedures without appropriate precautionary measures can result in fatal injuries.



Warning!

Warns that certain working procedures without appropriate precautionary measures can result in severe bodily injuries.



Caution!

Warns that certain working procedures without appropriate precautionary measures can result in bodily injuries or damage to the machine.

Following these notes does not relieve you from observation of additional regulations and guidelines!

The following must also be observed:

- the safety regulations valid for the jobsite.
- those issued by the legislature "Traffic regulations".
- the guidelines issued by trade associations.

Safety guidelines in these Operating instructions

The detailed descriptions of the following safety guidelines are in the Operating instructions of the machine and must be strictly observed.

- 1 Introduction
- 2 Destined use
- 3 Signs on the machine
- 4 Safety guidelines
 - 4.1 General safety guidelines
 - 4.2 Crushing and burn prevention
 - 4.3 Fire and explosion prevention
 - 4.4 Machine start up safety
 - 4.5 Engine start up safety
 - 4.6 Machine operating safety
 - 4.7 Machine parking safety
 - 4.8 Machine transporting safety
 - 4.9 Machine towing safety
 - 4.10 Machine maintenance safety
 - 4.11 Safety guidelines for welding work on the machine
 - 4.12 Safety guidelines for working on the attachment
 - 4.13 Safety guidelines when loading the machine with a crane
 - 4.14 Safe maintenance of hydraulic hoses and hose lines
 - 4.15 Safety guidelines for maintenance work on machines with hydro accumulators
 - 4.16 Roll over protection (ROPS) and falling object protection (FOPS)
 - 4.17 Attachment and components
 - 4.18 Safe operation for material handling
 - 4.19 Protection from vibration
 - 4.20 Safety guidelines for operation with quick coupler adapter (optional)

1.3.001 Tightening torques

The preload values and tightening torques noted in the chart have been taken from the VDI guidelines 2230 of July 1986.

Installation preload values F_M and tightening torques M_A for shoulder studs with standard metric or fine thread per DIN ISO 262 and DIN ISO 965 T2 (replacement for DIN 13 part 13) and wrench sizes for hex head screws with shaft DIN EN 24014 (replacement for DIN 931 part 1) or socket head screws DIN EN ISO 4762 (replacement for DIN 912)

- The chart values are valid for screws with black or phosphated, zinc plated and DACROMET 500. Screws and nuts with black, phosphated or zinc plated, lightly lubricated. Medium friction value $\mu_G = 0,12$.



Note!

Any tightening torque values and/ or tightening procedures noted in drawings / parts lists, instructions or component descriptions must be adhered to and given preference over factory standards.

Beginning with grade 10.9, the use of lock washers does no longer provide any safety action.

Always use correctly sized torque wrenches – the torque value according to the chart should be within the upper third of the existing range.

When using impact wrenches, care must be taken so that the torque values are not exceeded. Check before and intermediately with a torque wrench.

1 Preload values and tightening torques with standard metric thread according to factory standard WN 4037 I

Metric standard thread	Preload values F_M based on grades in N			Tightening torques M_A based on grades in Nm			Wrench size, (x) = according to DIN931, for			
	8.8	10.9	12.9	8.8	10.9	12.9	Hex head screw		Socket head screw	
							mm	Inch	mm	Inch
M 4 x 0,7	4 050	6 000	7 000	2,8	4,1	4,8	7	9/32	3	--
M 5 x 0,8	6 600	9 700	11 400	5,5	8,1	9,5	8	5/16	4	5/32
M 6 x 1	9 400	13 700	16 100	9,5	14,0	16,5	10	--	5	--
M 7 x 1	13 700	20 100	23 500	15,5	23,0	27,0	11	--	--	--
M 8 x 1,25	17 200	25 000	29 500	23	34	40	13	1/2	6	--
M 10 x 1,5	27 500	40 000	47 000	46	68	79	(17) 16	(11/16) --	8	5/16
M 12 x 1,75	40 000	59 000	69 000	79	117	135	(19) 18	(3/4) --	10	--
M 14 x 2	55 000	80 000	94 000	125	185	215	(22) 21	(7/8) --	12	--
M 16 x 2	75 000	111 000	130 000	195	280	330	24	--	14	9/16
M 18 x 2,5	94 000	135 000	157 000	280	390	460	27	1-1/16	14	9/16
M 20 x 2,5	121 000	173 000	202 000	390	560	650	30	1-3/16	17	--
M 22 x 2,5	152 000	216 000	250 000	530	750	880	(32) 34	--	17	--
M 24 x 3	175 000	249 000	290 000	670	960	1120	36	1-7/16	19	3/4
M 27 x 3	230 000	330 000	385 000	1000	1400	1650	41	1-5/8	19	3/4
M 30 x 3,5	280 000	400 000	465 000	1350	1900	2250	46	1-13/16	22	7/8
M 33 x 3,5	350 000	495 000	580 000	1850	2600	3000	50	2	24	--
M 36 x 4	410 000	580 000	680 000	2350	3300	3900	55	2-3/16	27	1-1/16
M 39 x 4	490 000	700 000	820 000	3000	4300	5100	60	2-3/8	27	1-1/16

2 Preload values and tightening torques with fine metric thread according to factory standard WN 4037 I

Metric fine thread	Preload values F_M based on grades in N			Tightening torques M_A based on grades in Nm			Wrench size, (x) = according to DIN931, for			
	8.8	10.9	12.9	8.8	10.9	12.9	Hex head screw		Socket head screw	
							mm	Inch	mm	Inch
M 8 x 1	18 800	27 500	32 500	24,5	36	43	13	1/2	6	--
M 9 x 1	24 800	36 500	42 500	36	53	62	--	--	--	--
M 10 x 1	31 500	46 500	54 000	52	76	89	17	11/16	8	5/16
M 10 x 1,25	29 500	43 000	51 000	49	72	84	17	11/16	8	5/16
M 12 x 1,25	45 000	66 000	77 000	87	125	150	19	3/4	10	--
M 12 x 1,5	42 500	62 000	73 000	83	122	145	19	3/4	10	--
M 14 x 1,5	61 000	89 000	104 000	135	200	235	22	7/8	12	--
M 16 x 1,5	82 000	121 000	141 000	205	300	360	24	--	14	9/16
M 18 x 1,5	110 000	157 000	184 000	310	440	520	27	1-1/16	14	9/16
M 18 x 2	102 000	146 000	170 000	290	420	490	27	1-1/16	14	9/16
M 20 x 1,5	139 000	199 000	232 000	430	620	720	30	1-3/16	17	--
M 22 x 1,5	171 000	245 000	285 000	580	820	960	32	--	17	--
M 24 x 1,5	207 000	295 000	346 000	760	1090	1270	36	1-7/16	19	3/4
M 24 x 2	196 000	280 000	325 000	730	1040	1220	36	1-7/16	19	3/4
M 27 x 1,5	267 000	381 000	445 000	1110	1580	1850	41	1-5/8	19	3/4
M 27 x 2	255 000	365 000	425 000	1070	1500	1800	41	1-5/8	19	3/4
M 30 x 1,5	335 000	477 000	558 000	1540	2190	2560	46	1-13/16	22	7/8
M 30 x 2	321 000	457 000	534 000	1490	2120	2480	46	1-13/16	22	7/8
M 33 x 1,5	410 000	584 000	683 000	2050	2920	3420	50	2	24	--
M 33 x 2	395 000	560 000	660 000	2000	2800	3300	50	2	24	--
M 36 x 1,5	492 000	701 000	820 000	2680	3820	4470	55	2-3/16	27	1-1/16
M 36 x 3	440 000	630 000	740 000	2500	3500	4100	55	2-3/16	27	1-1/16
M 39 x 1,5	582 000	830 000	971 000	3430	4890	5720	60	2-3/8	27	1-1/16
M 39 x 3	530 000	750 000	880 000	3200	4600	5300	60	2-3/8	27	1-1/16

3 Tightening torque for screws to mount SAE flange

(not part of factory standard WN 4037 I)

Listing according to LFR – Quality service 2QA 6 051 00 as of Oct. 2001

3.1 Flanges and half flanges for high pressure (Norm 62)

Flange nominal size	Screw size	Tightening torques in Nm for screw grade 10.9		
		Half flange	Flat flange without reinforcement rim	Flange with reinforcement rim
1/2"	M 8	31	--	--
3/4"	M 10	62	45	65
1"	M 12	108	70	110
1 1/4"	M 14	172	120	180
1 1/2"	M 16	264	170	250
2"	M 20	350	250	450

3.2 Half flange for low pressure (Norm 61)

Flange nominal size	Screw size	Tightening torques in Nm for	
		Screw grade 8.8	Screw grade 10.9
1/2"	M 8	22	31
3/4"	M 10	44	62
1"	M 10	44	62
1 1/4"	M 10	44	62
1 1/2"	M 12	76	108
2"	M 12	76	108
2 1/2"	M 12	76	108
3"	M 14	122	172
3 1/2"	M 16	187	264
4"	M 16	187	264
5"	M 16	187	264

3.3 Tightening torque for oil drain plugs on travel gear (40 km/h)

(not part of the factory standard WN 4037 I)

Plug Thread size	Tightening torques in Nm
M 26x1,5	40+10

1.3.002 Conversion charts

Unit of measure	Multiply	by	To obtain - Multiply	by	To obtain
Length	mm	0,039	inch	25,4	mm
	m	3,281	feet	0,305	m
	m	1,093	yard	0,914	m
	km	0,621	mile	1,609	km
Area	cm ²	0,155	sq. inch	6,452	cm ²
	m ²	10,764	sq. feet	0,093	m ²
	m ²	1,196	sq. yard	0,8361	m ²
	km ²	0,386	sq. mile	2,59	km ²
Volume	cm ³	0,061	cu. inch	16,387	cm ³
	m ³	35,314	cu. feet	0,028	m ³
	m ³	1,308	cu. yard	0,764	m ³
	l	61,025	cu. inch	0,016	l
	l	0,035	cu. feet	28,316	l
	l	0,264	gallon	3,785	l
	l	1,057	quart	0,946	l
Weight	g	0,035	oz.	28,349	g
	kg	2,204	lbs.	0,453	kg
	t	1,102	short t	0,907	t
Force	N	0,225	lbs.	4,449	N
	kN	224,732	lbs.	0,0044	kN
Torque	Nm	0,737	ft. lbs.	1,356	Nm
Power	kW	1,342	HP	0,745	kW
	PS	0,736	kW	1,358	PS
	PS	0,986	HP	1,014	PS
Pressure (hydraulic)	bar	14,5	PSI	0,069	bar
	kpa	0,145	PSI	6,896	kpa
Ground pressure	kg/cm ²	14,223	lbs. sq. inch	0,0703	kg/cm ²
	kg/m ²	0,205	lbs. sq. ft.	4,878	kg/m ²
Compression	g/cm ³	0,036	lbs. cu. inch	27,78	g/cm ³
	kg/m ³	0,062	lbs. cu. ft.	16,13	kg/m ³
Speed	km/h	0,621	mph	1,609	km/h
	m/min	3,281	ft. / min	0,305	m/min
Temperature	°C	(°C x 1,8) + 32	°F	(°F - 32) / 1,8	°C
	°C	°C + 273	°K	°K - 273	°C

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