en **Operator's manual**

Pipe layer

Document ID

ORIGINAL OPERATOR'S MANUAL

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From Serial no.: 15374

Contact

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1.3.3 Warranty coverage from manufacturer

For all emission-relevant parts of off-road engines from 2011 or later which were bought in the United States of America, a warranty period of five years or 3,000 operating hours is granted, whichever comes first. If an emission-relevant engine part is defective, this part will be repaired or replaced by an authorised Liebherr dealer.

1.3.4 Warranty obligations of the owner

- The owner of the off-road engine with self-ignition is responsible for performance of the necessary maintenance that is listed in the operating and maintenance manual of the machine. Liebherr recommends that the owner keeps a log book and keeps all records documenting the maintenance of the off-road engine, however Liebherr cannot reject the warranty solely due to missing documents or failure to perform all scheduled maintenance work.
- Liebherr can reject the warranty coverage if the off-road engine with self-ignition, or a part thereof, has failed due to misuse, negligence, improper maintenance work or due to unauthorised changes.
- The off-road engine with self-ignition is designed to be operated exclusively with ultra low sulphur fuel. The use of other fuels may result in the diesel engine no longer complying with the EPA's and the CARB's emission regulations.
- The owner is responsible for initiating the warranty process. The EPA and CARB recommend that off-road engines or machines are immediately taken to an authorised Liebherr dealer when a problem occurs in order to have the warranty service performed on behalf of Liebherr. The warranty repairs must be performed by an authorised dealer as quickly as possible.

Questions regarding the warranty rights and obligations or the site of the nearest authorised Liebherr dealer must be addressed to the Liebherr Service Department in Newport News, VA, (757) 245-5251.

1.3.5 Warranty

Liebherr guarantees that all off-road diesel engines from 2011 and later that have been certified and registered for sale in the United States of America and the State of California have been developed, designed and equipped in such a way that they meet all applicable EPA and ARB regulations. Liebherr guarantees that this diesel engine is free from material and processing errors that could lead to the failure of a warranty part, which is identical in all materials with the part described in the certification application from the engine manufacturer; this warranty applies for a period of five (5) years or 3,000 operating hours, whichever occurs first. The warranty period begins on the day when the diesel engine or machine is delivered to the final buyer. Liebherr also guarantees that every part on the list of emission parts covered by the warranty and installed as original equipment is free from material and processing errors that could result in this diesel engine not meeting the emission standards passed by EPA and ARB; this warranty applies for five (5) years or 3,000 operating hours, whichever occurs first. With the exception of warranty parts, the replacement of which is required according to the maintenance and inspection schedule, warranty parts that fail during the warranty coverage period will be repaired or replaced by an authorised Liebherr dealer on behalf of LCE and free of charge for the owner. For parts that are repaired or replaced during the warranty period, a warranty is granted for the remaining warranty period. If a warranty part whose replacement is required according to the maintenance and inspection schedule fails before the first scheduled replacement of this part, this part will be repaired or replaced by an authorised Liebherr dealer on behalf of Liebherr and

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Electrical System

1 halogen working lights on right side on cable winch	•
2 cold start batteries	•
2 halogen working lights on engine hood, front	•
2 halogen working lights on the cab, rear	•
3 halogen working lights on left side	•
All working lights in LED version	+
Alternator 140 A	•
Amber beacon	+
Back-up alarm	+
Back-up alarm acoustic, disengageable	+
Battery main switch mechanical, lockable	•
Horn	•
Immobiliser, electronic	1)
On-board voltage 24 V	•
Starter	•

Control and Warning Lights

Display engine coolant temperature	•
Display fuel level and urea stock (digital)	•
Display travel speed ranges	•
Hour meter (digital)	•
Indicator light air filter contamination	•
Indicator light battery charge	•
Indicator light diesel engine	•
Indicator light hydraulic oil temperature	•
Indicator light oil filter contamination	•
Indicator light oil level in hydraulic oil tank	+
Indicator light pump replenishing pressure	•
Indicator parking brake	•
Overload warning system	+

Hydraulic System

1 control block with 3 hydraulic circles	•
3 additional circuit segments	+
Free fall device	•
Hydraulic control counterweight	•
Hydraulic control winch and boom	•
Hydraulic servo control	•
Hydraulic tank oil level control	+
Oil filter in hydraulic tank	•
Variable flow pump, load-sensing	•

Attachments

Boom 27'10"	•
Boom 34'5"	+
Boom protection strips	+
Counterweight	•
Counterweight, rear	+
Drawbar rear, rigid with two lugs	+
Hook with rope	•
Hydraulic attachment kit for hydraulic pump, e.g. for crane	1)
Hydraulic attachment kit for operation of generator and pipefacing	+
Mounting plate for third-party equipment	1)
Winch, rear	1)

• = Standard
+ = Option
1) on demand

Options and / or special attachments, supplied by vendors other than Liebherr, are only to be installed with the knowledge and approval of Liebherr in order to retain warranty.

2 Safety guidelines, signs

Working with the machine is dangerous, serious or fatal injuries can happen to you, the operator, the driver or maintenance personnel. If you regularly read and observe the various safety information, you can prevent dangers and accidents.

This applies especially for personnel who is working only intermittently on the machine, such as for set up, maintenance.

The following information comprises safety guidelines which, if followed conscientiously, will guarantee your safety and that of other persons, as well as avoid damage to the machine.

For description of work, which can pose a danger for man or machine, the required safety precautions are described in this manual.

2.1 Designation of warning notes

	This is the warning sign. Warns of possible danger of injury. Follow all measures, which are marked with this warning sign to avoid injuries or death.

Tab. 8

The warning sign always appears in connection with the signal words

DANGER
WARNING
CAUTION

	**DANGER**	designates a dangerous situation which will lead to death or serious injury if it is not prevented.
	**WARNING**	designates a dangerous situation, which can lead to death or serious injury if it is not prevented.
	**CAUTION**	designates a dangerous situation, which can lead to light or medium injuries if it is not prevented.
	ATTENTION	designates a dangerous situation, which can lead to property damage if it is not prevented.

Tab. 9

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Parking switch sign

Fig. 25: Parking switch sign

The sign is located on the left of the operator's cab.

Warns of risk of accidents potentially resulting in death or very severe injuries.

Meaning: **Before leaving the operator's cab, switch the parking switch to park position. In dangerous situations, lower the working attachment immediately, then switch the parking switch to park position!**

High voltage wiring sign

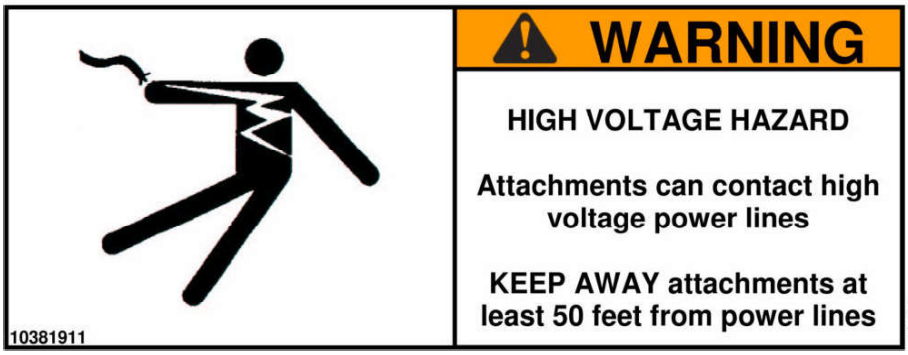

Fig. 26: High voltage wiring sign

The sign is located on the left of operator's cab.

Noise protection sign

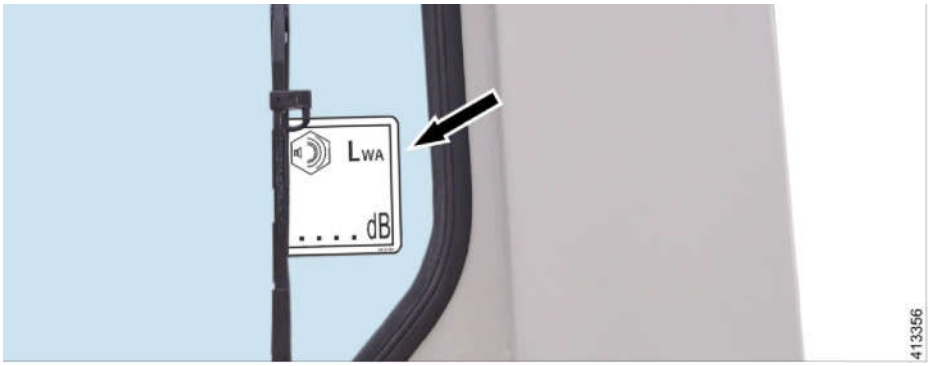

Fig. 43: Noise protection sign

The sign is located on the left operator's cab window.

LWA = Sound power level (sound power level emitted to the surrounding area)

Diesel fuel sign

Fig. 44: Diesel fuel sign

The sign is installed on the filler pipe of the fuel tank.

Shows the diesel fuel to be used.

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2.4.9 Safety guidelines for turning the machine off

1. Park the machine only on firm and level ground. If it becomes necessary to park the machine on a grade, it must be properly blocked and secured with wedges to prevent any unintentional movement.
2. Lower the raised load to the ground.
3. Bring all control levers to neutral position, place the safety lever up and turn the engine off according to the Operating instructions before leaving the operator's seat.
4. Lock the machine, remove all keys and secure the machine to prevent unauthorized use and vandalism.
5. Never park the machine in such a way as to block access to entrances, exits, ramps, fire hydrants, etc.

2.4.10 Safety guidelines for transporting the machine

1. Use only suitable transport devices and lifting devices with sufficient load carrying capacity.
2. Park the machine on level ground and block the chains or wheels with wedges.
3. If necessary, remove parts of the attachment for the duration of transport.
4. When loading a machine on a transport vehicle, be sure that the loading ramp incline is less than 30° and is covered with wooden planks to prevent slipping.
5. Before moving onto the ramp, clean the chains or wheels of the machine, remove any snow, ice or mud.
6. Align the machine with the loading ramp.
7. Use a guide to signal the machine operator. Drive onto the ramp and onto the transport vehicle very carefully
8. Secure the machine and the remaining parts with chains and wedges to prevent them from slipping.
9. Relieve pressure from hydraulic lines and hoses, remove the ignition key, lock the cab and all covers before leaving the machine.
10. Carefully check out the transporting route beforehand, especially in regards to width, height and weight limitations.
11. Check that there is enough clearance underneath all electrical lines, bridges, underpasses and in tunnels.
12. During the unloading procedure, proceed with the same caution as during the loading procedure.
    Procedure:
    - Remove all chains and wedges. Start the engine as outlined in the operating instructions.
    - Carefully drive off the loading platform down the ramp.
    - Have another person guide and signal you.

2.4.11 Safety guidelines for towing the machine

1. Always follow the correct procedure according to the instructions in the **Operating instructions**, refer to section "Tow the machine".
2. The machine may only be towed in exceptional circumstances, for example to move the machine from a dangerous area for repair.
3. Before pulling or towing, check all towing and pull devices for safety and stability.
4. The cable or the rod, which is used to tow the machine must be adequate to pull the machine and must be connected to the appropriate bores and towing devices. Damage or accidents which occur during towing of the machine cannot be covered by the manufacturer's guarantee under any circumstances.

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- If paint chips are created when releasing connections (due to possible excess paint application), then remove these paint chips carefully before releasing the fittings all the way.
- Close off all removed parts on the clean side of the fuel system **immediately** on their connection ports with suitable caps. The capping material must be packed dust-free until used and must be disposed after one-time use.
- Store the removed parts carefully in a clean, closed off container.
- **Never** use previously used cleaning or test fluids for the removed parts.
- Remove new parts from their original packaging just immediately before use.
- Carry out work on removed components only on a workstation which is equipped for this purpose.
- To ship removed parts, always use the original packaging of the new part.

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16 *Hoist limit switch* button

Fig. 83: Hoist limit control

For lifting the hook block when the hoist limit switch is activated.

If hook block is raised too far, it is turned off by actuation of hoist limit switch. If the hook block must be raised further for installation and removal, press button **16**.

NOTICE
Danger of damaging machine!
If the hook block is raised when hoist limit switch button is pressed, then the working attachment (winch, hook block, boom) can be damaged.

▶ Lift hook block carefully. As soon as the hook blocks are touching, stop the hoist procedure immediately.

17 *Bypass overload warning device* button

Fig. 85: Bypass overload warning device button

If overload warning device is not installed, press the bypass switch so that the working attachment functions.

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21 Automatic speed reduction[7] (option)

– Symbol lights up:
  Display if automatic speed reduction is activated.
– Symbol flashes:
  Display if diesel engine speed is reduced due to automatic speed reduction.

22 Open buckle (option)

– Display when buckle is open.
  Goes off when buckle is closed.

Display - warning symbols

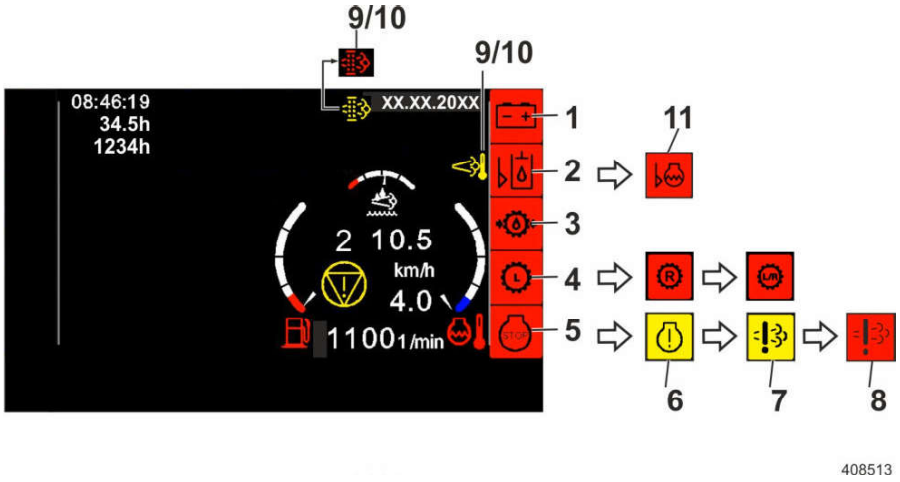
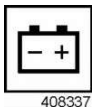


Fig. 127: Display - warning symbols

1	Battery charge - charge monitoring	**6**	Diesel engine problem
2	Hydraulic oil level	**7, 8**	Malfunction - exhaust gas treatment
3	Supply pressure	**9**	Regeneration - exhaust gas treatment
4	Travel gearbox - temperature monitoring	**10**	Diesel particle filter
5	Diesel engine stop	**11**	Coolant level (option)

1 Battery charge - charge monitoring



Goes out once diesel engine has started up.

– Display, for example, if the V-belt is broken.
  If the display lights up, turn the diesel engine off and remedy the problem.

[7] Except for RL46/RL56/RL66

Reset daily operating hours

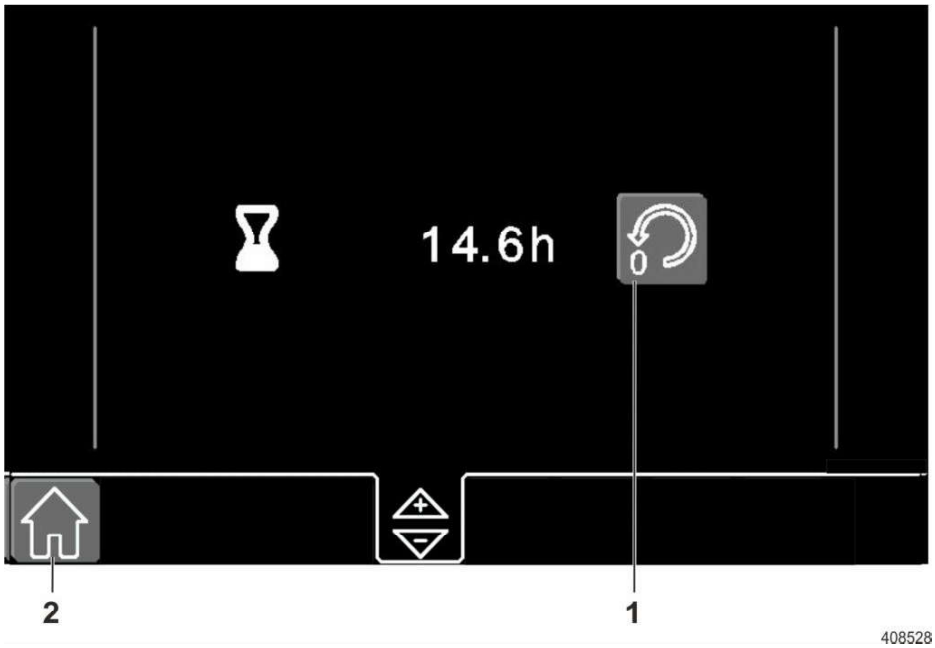


Fig. 163: Reset daily operating hours

– Reset daily operating hours via the symbol **1** to 0h (operating hours).
– Leave the menu via the main menu **2** symbol.

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Automatic diesel engine stop (option)

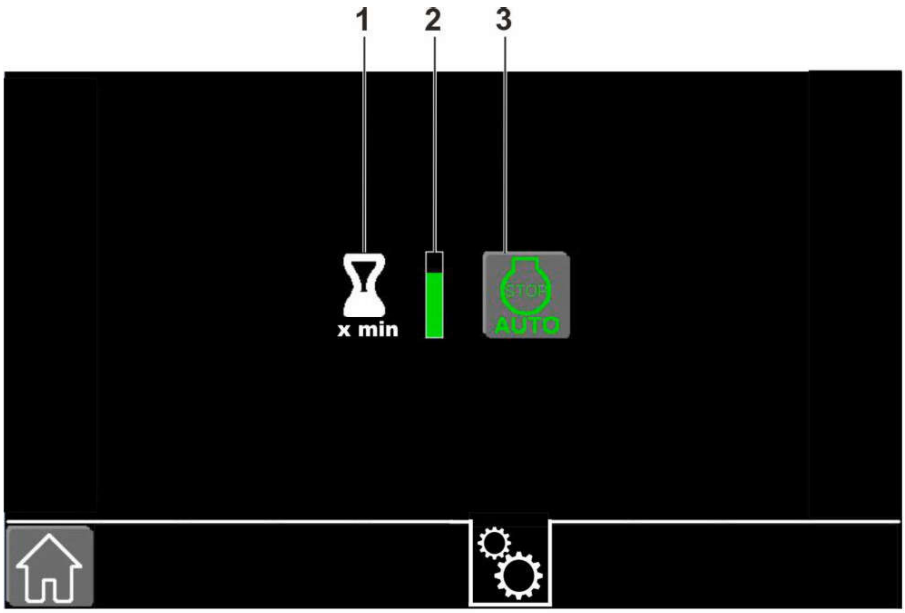

Fig. 173: Automatic diesel engine stop

1 Defined time period until diesel engine stop
2 Remaining time period until diesel engine stop
3 Activation diesel engine stop

– When the function is active, the diesel engine in idling operation is automatically turned off after a defined time period.

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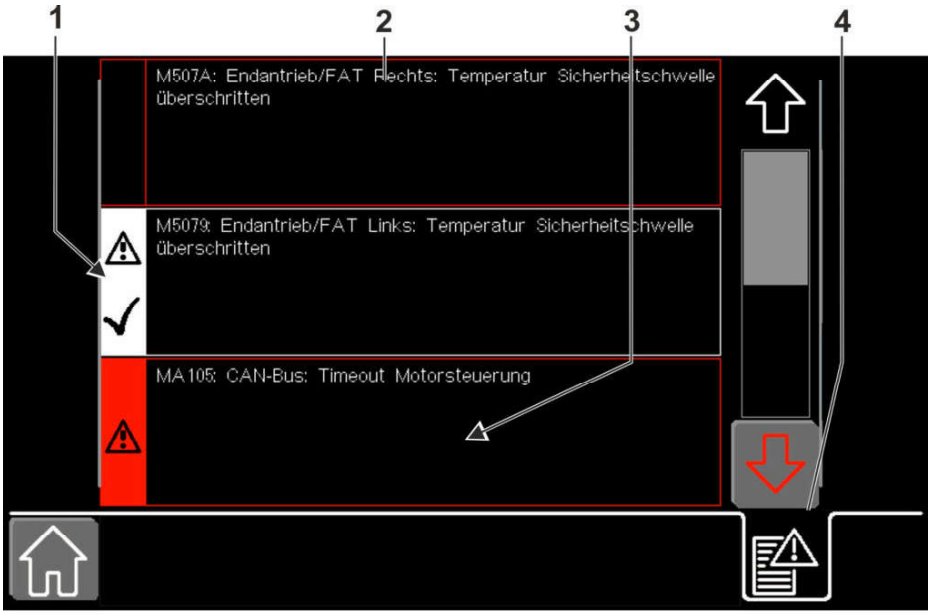

Fig. 183: Service codes

1 White: error is active and confirmed

2 Red: error was active, is not currently active and was not confirmed

3 Red: error is active and was not yet confirmed

– Confirm service code by pressing on text. The bar is changed from red to white.
– If additional service codes are present, show them by scrolling to the next pages.
– After confirmation of all messages, the symbol colour **4** changes to flashing white.
– Contact Liebherr customer service, if necessary.

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CAUTION
Potential damage to health due to incorrectly adjusted operator's seat!

▶ Adjust the body weight before operating the machine.

Fig. 198: Adjusting the body weight

9 *Weight adjustment* lever

▶ Adjust the body weight when the machine is at a standstill and while seated on the operator's seat by pulling the lever **9** momentarily.
▷ Automatic weight adjustment.

Adjusting the operator's seat height

Adjustment is possible in several stages.

Fig. 199: Adjusting the shock absorber

11 *Shock absorption* lever

To adjust the operator's seat height, set the shock absorber setting to soft.

▶ Set the lever **11** to Position 1.

The height adjustment is pneumatic and continuously variable.

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Adjusting the backrest incline

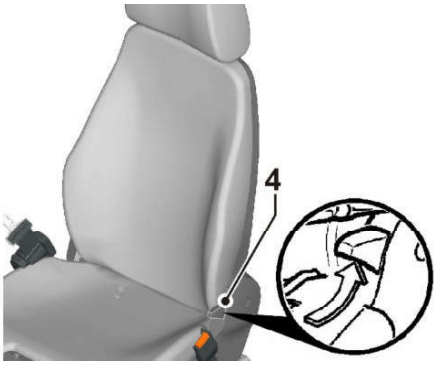

Fig. 217: Adjusting the backrest incline

4 *Backrest inclination* lever

▶ Lift the lever **4**.

▶ Adjust the backrest to the desired incline.

▶ Release the lever **4**.

Adjusting the lumbar support

The lumbar support increases the seat comfort.

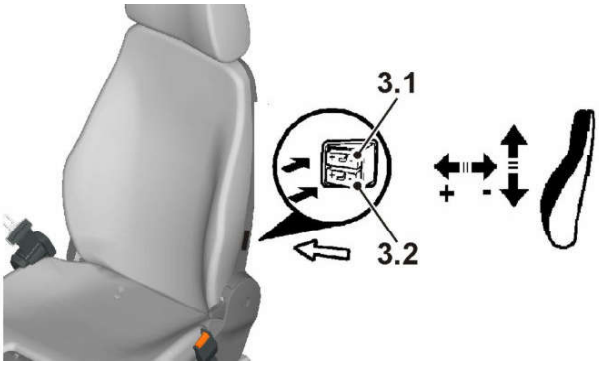

Fig. 218: Adjusting the lumbar support

3 *Lumbar support* button

To adjust the lumbar support:

▶ Move the button **3.1** or button **3.2** in direction “+” or “-”.

Note

When the curvature of the backrest cushion no longer changes by setting the switch to “+” then the maximum curvature of the backrest cushion is reached.

▶ Release the button **3**.

Fig. 235: Closing belt

- ▶ Hold latch lock with the left hand and pull the belt over the body at lap height.
- ▶ Insert belt buckle into the latch lock and check if the latch lock is engaged by pulling on the belt buckle.

Releasing safety belt

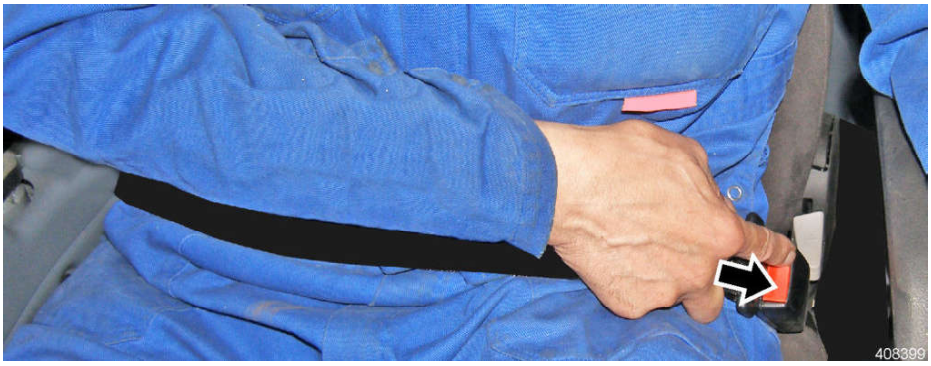

Fig. 236: Releasing belt

- ▶ Release belt: push lock on the snap-lock downward.

3.2.10 Adjusting armrests

The height, angle and incline of the armrest can be adapted to suit individual requirements.

Before adjusting the armrests, adjust the operator's seat.

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Fig. 253: Compartment

- ▶ Push the knob **1** on the lock and open the cover.
- ▶ Place the Operating instructions of the machine in the compartment.

Note

- ▶ **Always store the Operating instructions in the machine!**

3.2.17 Reversing warning device (option)

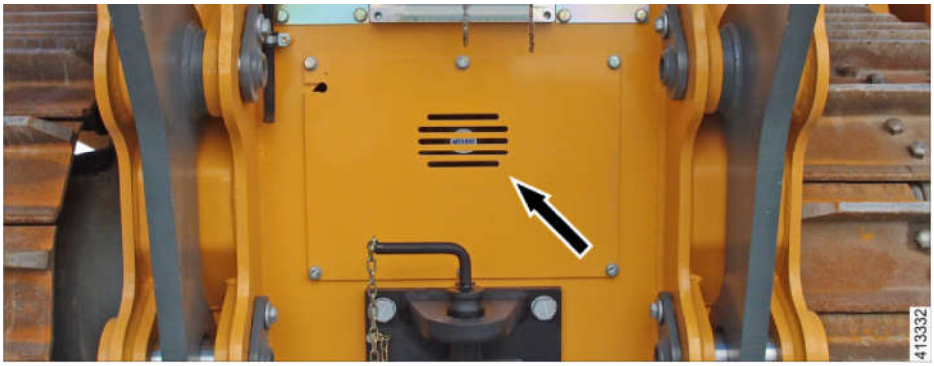

Fig. 254: Back up alarm

The back up alarm sounds if the travel joystick is moved into position for “reverse travel”.

Personnel near the machine are warned by the horn.

The back up alarm is located in the rear of the machine. The sound level is set automatically.

Before putting the machine into service, deflect the travel joystick to the position for “reverse travel” to check the function of back up alarm.

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Fig. 272: Suction hose with suction basket

2 Suction hose **8** Suction strainer

▶ Remove the blind couplings on the connection of the refuelling pump and on the suction hose **2.**

Fig. 273: Suction hose

▶ Connect the suction hose **2** on the refuelling pump's connector.

NOTICE
The machine is refuelled without suction basket!
Damage to refuelling pump due to drawing in foreign particles.

▶ Always refuel with suction basket on the suction hose.

▶ Place the suction hose **2** with the installed suction basket **8** into the fuel barrel.

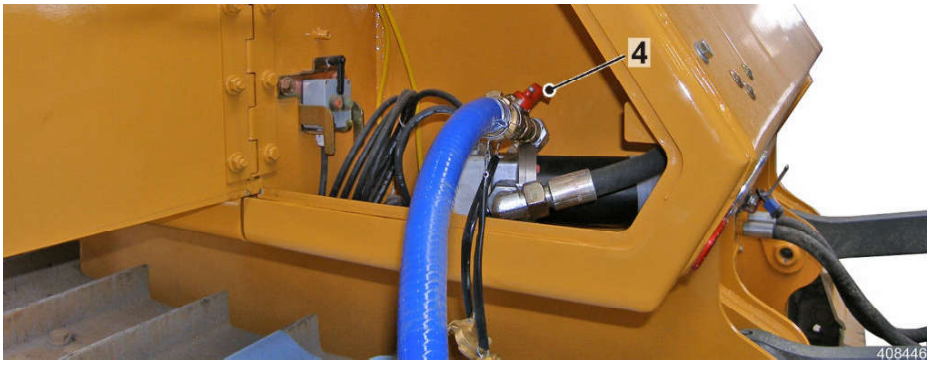

Fig. 274: Opening shut-off valve

Starting preparations in freezing temperatures

Fig. 288: Winter operation

The following preparations improve the starting behaviour at low temperatures.

Preparations:
– Check the battery charge, recharge the battery if necessary.
– Use winter fuel. See section “lubricants and fuels” under winter operation.

WARNING
When using ether based starting aids to start diesel engines with pre-heat systems, there is a risk of explosion!

▶ Do not use ether based starting aids.

▶ Carry out the listed preparations for starting at freezing temperatures.

NOTICE
The cold diesel engine is subjected to a full load!
If the diesel engine is subjected to a full load when cold, it may be damaged.

▶ Let the diesel engine warm up.

▶ After starting procedure, leave engine speed controller at idling speed and wait until diesel engine is warm before subjecting it to a full load.

3.3.4 Travel mode

The preparations for travel mode must be carried out in the specified sequence.

Ensure that following requirements are met:
❑ Machine is in operating position.

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▷ Parking brake is released.

3.3.7 Taking machine out of service

Before turning the diesel engine off and leaving the machine, make following preparations.

– Set travel joystick in neutral position.

Raising working attachment

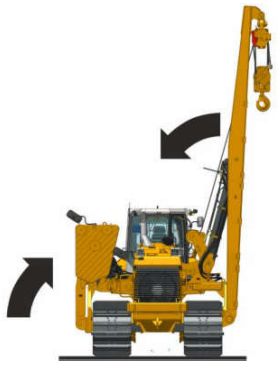

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Fig. 306: Working attachment

▶ Lift the boom completely.

▶ Lift the hook block completely.

▶ Fully retract counterweight.

Parking machine at temperatures below freezing

NOTICE
The machine's travel gear is frozen to the ground!
If the machine is ripped loose forcefully, significant damage may occur.

▶ Carefully heat the track pads to release the machine.

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Fig. 307: Parking at temperatures below freezing

▶ Park the machine on wooden boards if the temperatures are below freezing.

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Attach loads

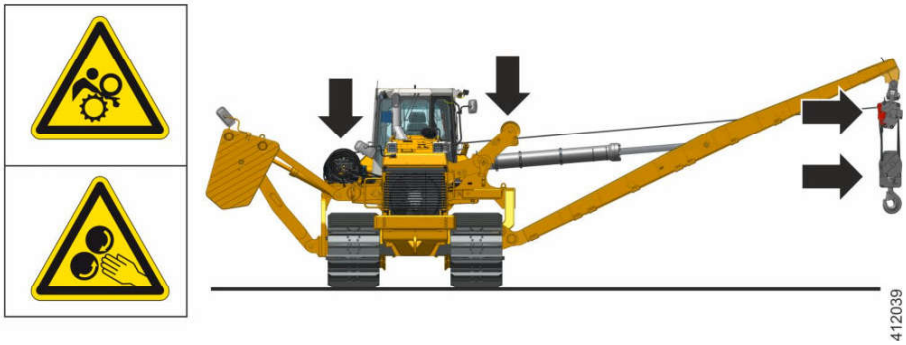

Fig. 324: Danger zones

CAUTION
Turning machine parts and hoist ropes!
Danger of injury if loose clothing or body parts are pulled in or pinched.

- ▶ When working, pay attention that fingers or loose clothing do not get into the pulleys of the hook block.
- ▶ Keep a sufficient safety distance and do not wear loose clothing.

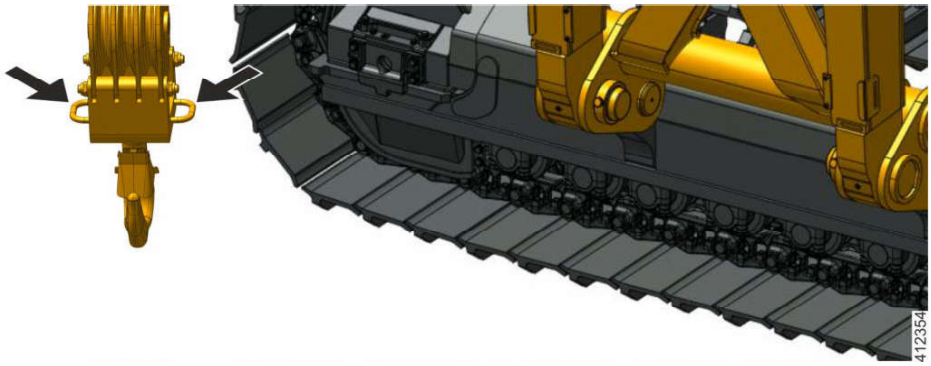

Fig. 325: Handles on hook block

- ▶ Bring the hook block in position only by hand via the handles.

Lower the load in an emergency

In case of failure of the diesel engine, or drop of replenishing pressure, a load suspended on the hook can only be lowered with the tools supplied in the on-board tool box.

Ensure that following requirements are met:
- ❑ Mini test line is on hand.
- ❑ Screwed connections are on hand.
- ❑ Extension pipe is on hand.

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Fig. 345: Hook block

- ▶ Fasten lifting device to handles of hook block.
- ▶ Align hook block so that it is parallel to pulley block and put it down on wooden blocks on the ground.
- ▶ Put rope down properly.

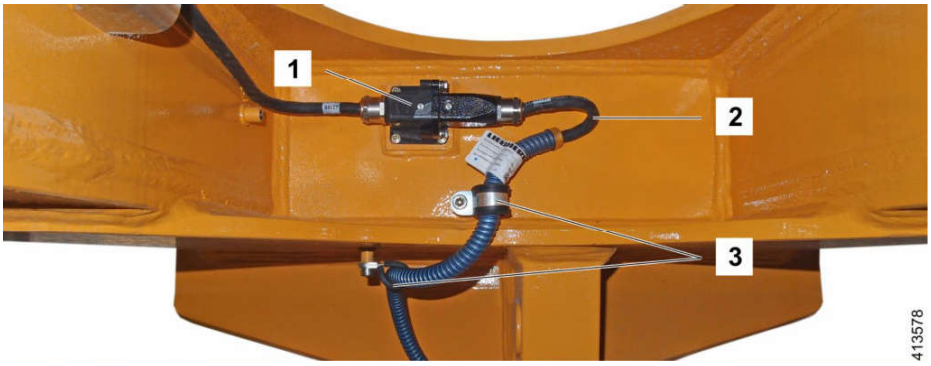

Fig. 346: Hoist limit switch line

- ▶ Connect hoist limit switch line **2** on plug **1** and fasten with screws.
- ▶ Attach hoist limit switch line **2** with clamps **3** on intended eyehooks.

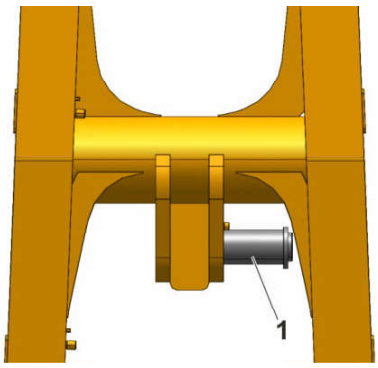

Fig. 347: Pin for hoist cylinder

- ▶ Grease pin **1** for hoist cylinder lightly and place it on bore in such a way that it does not protrude.

▶ Lift frame **2** on the outer end with a suitable lifting device until counterweight frame **13** can be pinned by guiding it horizontally with a suitable lifting device.

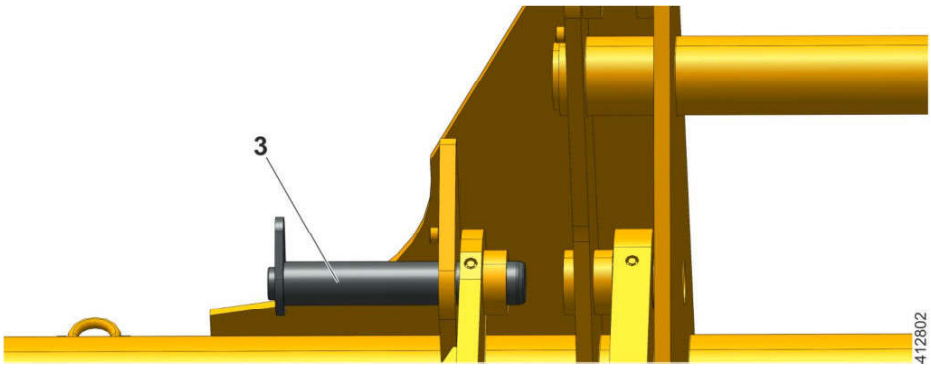

Fig. 372: Knocking in pin

▶ Knock pin **3** in just to point where bearing forks remain clear for hydraulic cylinders.

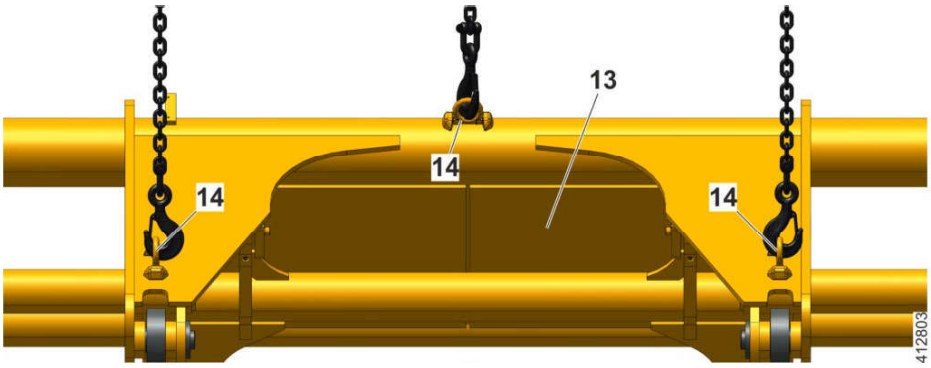

Fig. 373: Swinging counterweight frame up

▶ Swing counterweight frame **13** up completely with a suitable lifting device on attachment points **14**.

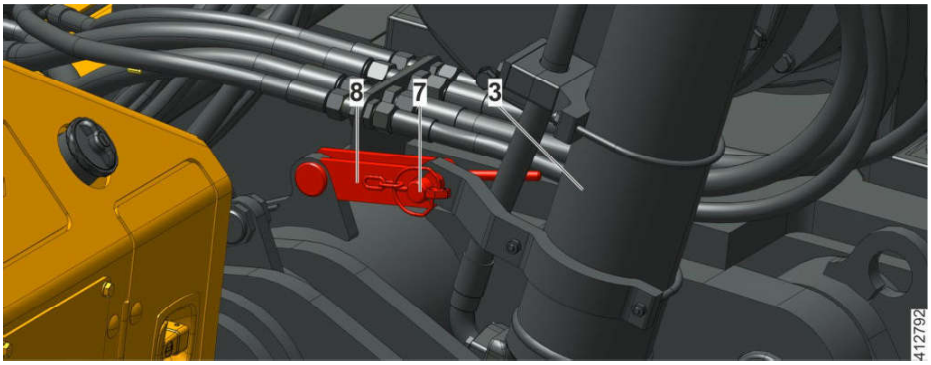

Fig. 374: Removing transport retainer for the hydraulic cylinders

▶ Remove cotter pin **7** and pin on both transport retainers **8**.

▶ Start machine.

3.6 Emergency operations

3.6.1 Function of emergency operation

The electronic system of the machine is monitored by the electronic box. If an error occurs, then this error is saved in the system. Depending on the error, the machine is switched into various types of the emergency operation.

Unrestricted operation

– Symbol Messages (Service codes) in the display unit blinks.
– Full scope of function of the machine.

▶ Check the Service code and carry out the required measures.

Restricted operation

– Symbol Messages (Service codes) in the display unit blinks.
– Limited scope of function of the machine.

▶ Contact Liebherr Service.

Safety lock out

– Symbol Messages (Service codes) in the display unit blinks.
– The machine is stopped and can no longer be operated.

▶ Contact Liebherr Service.

3.6.2 Towing machine

In case of a problem, the machine must be towed from the danger zone, if necessary, or it might be able to be backed out from the danger zone.

The following towing instructions are for exceptional situations exclusively and for bringing a disabled machine to a location, where it can be repaired or loaded.

Towing speed and towing distance:
– Max. towing speed no more than 1 mph (walking speed),
– exclusively short distances are permitted to tow the machine from danger zone (max. 656‘ 2“ ft-in).

Always use a transport vehicle to convey the machine over long distances!

Towing the machine is problematic and is always carried out at the owner's risk.

Damage or accidents which occur when towing the machine cannot be covered by the manufacturer's guarantee under any circumstances.

Safety when towing

WARNING
Risk of accidents due to improper towing!
Towing a disabled machine improperly can result in severe injuries or death.

▶ Before removing the sun gears, always secure the machine to prevent it from rolling off.

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4 Operating problems

Warning messages and fault messages:
- Various malfunctions are shown via respective symbols or service codes on the display. (For more information see: 3.1.3 Display unit, page 82)
- Warning functions are also acoustically supported if necessary.

Identifying and rectifying faults and errors:
- Malfunctions can very often be traced back to incorrect operation or maintenance of machine.
  For that reason, read the relevant chapter in the operator's manual again carefully for each malfunction.
- **Analyse the cause of the malfunction and rectify it immediately!**
- Describe the malfunction and all accompanying circumstances when you contact **Liebherr customer service**. Precise information makes it possible to find and rectify the cause of the fault quickly. Additionally, precise information on the type and serial number of the machine is also required.
- Do not carry out any work which you have not been trained or instructed to do.

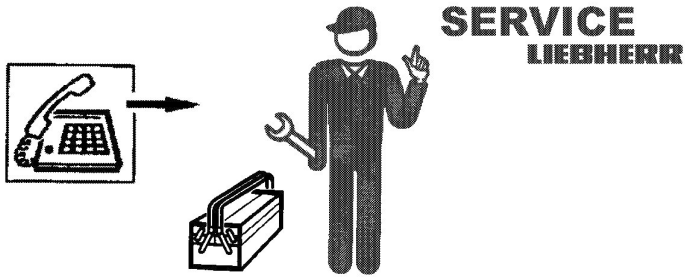

Fig. 408: Liebherr customer service

Note
It is not possible to identify or correct the malfunction using the service codes.

▶ Contact Liebherr customer service.

4.1 Servicecodes

4.1.1 Service code - Display unit

The machine is monitored in many functions by the control system.

It is monitored for short circuit, broken wires, external voltage and incorrect incoming and outgoing signals.

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Fuse	Value	Unit	Name / Function
F13	1	A	Parking switch
F14	7.5	A	Parking switch relay
F15	80	mA	Seat contact switch
F16	5	A	WH sensor button supply
F17	1	A	Emergency off contact
F18	10	A	Pumps and motor solenoid valves
F19	1	A	Analog output module logic supply
F20	10	A	Heating
F21	7.5	A	Air cushioned operator’s seat and seat heater
F22	1	A	Warning buzzer and intermittent function
F23	1	A	ECU malfunction
F24	1	A	Frequency sensors
F25	10	A	Blade release position circuit board
F26	1	A	Digital input module logic supply
F27	3	A	Digital input module sensor supply
F28	3	A	Reversing warning device[A)]
F29	5	A	PME display unit
F30	10	A	Master PME
F31	1	A	Master Awake-Signal
F32	3	A	Horn
F33	3	A	Travel sensor
F34	1	A	Tank sensor
F35	30	A	Operator's cab
F36	30	A	ECU power supply
F37	10	A	Air pump
F38	1	A	ECU power supply
F39	3	A	ECU power supply
F41	3	A	NOx sensor
F45	3	A	NH3 sensor
F46	3	A	Heating control drive on the air conditioning unit
F47	10	A	Machine socket 24 V
F48	3	A	Engine compartment illumination headlight
F49	3	A	Operator's cab lighting
F50	3	A	Engine diagnostics plug
F51	5	A	Transformer
F52	15	A	Fuel water separator heating[A)]
F53	5	A	Webasto timer[A)]

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5.2 Fill quantities, lubrication schedule

5.2.1 Recommended lubricants

Name	Recommended lubricant	Symbol	Quantity
Diesel engine (with filter change)	Liebherr-Motoroil 5W-30 Liebherr-Motoroil 5W-30 low ash A) Liebherr-Motoroil 10W-40 Liebherr-Motoroil 10W-40 low ash A)		7.66 gal
Hydraulic system System content Tank contents	Liebherr Hydraulic Basic 68 Liebherr Hydraulic Basic 100 Liebherr Hydraulic HVI Liebherr Hydraulic Plus Liebherr Hydraulic Plus Arctic		 61.82 gal 29.32 gal
Travel gearbox Left right	Liebherr Hypoid 85W-140 EP Liebherr Syntogear Plus 75W-90	 	 5.55 gal 4.49 gal
Duo cone (slip ring) seal for travel gearbox	see hydraulic system		2.46 gal
Axle bearing (both left and right)	see hydraulic system		1.19 gal
Hoist winch Oil motor side Freefall side	Liebherr Hydraulic HVI Liebherr Hydraulic Plus Arctic	  	 1.27 liq qt 2.25 gal
Bearing points and track tensioner	Liebherr Universal grease 9900 Liebherr Universal grease Arctic		10.58 lb

Tab. 23: Recommended lubricants

A) Use low ash engine oil for machines with a diesel particle filter.

5.2.2 Recommended fuel and operating fluids

Name	Recommended fuel and operating fluid	Symbol	Quantity
Fuel tank	Standard diesel fuel with a sulphur content less than or equal to 0.5 %		113.59 gal

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When using these hydraulic oils, an auxiliary flow filtration system is not necessarily required.

If these oils are not available locally, then only oils based on fully saturated synthetic ester (HEES) may be used (after consultation with Liebherr Service).

When using synthetic ester based oils, we recommend that hydraulic hoses are changed after 4000 operating hours or no later than after four years of use.

Plant-based oils are not permissible for use due to their insufficient temperature properties.

Polyglycoles can be used due to their paint and sealing incompatibility in special cases, but only after consultation with Liebherr Service.

When using third party products, we recommend to check with the manufacturer first to ensure that the above stated specifications are met by this third party product.

Oil change, oil analysis, filter change

Oil change

Note
Liebherr recommends operation with regular oil analysis.

▶ For additional information, see: Oil analysis

Oil grade	Oil change		
	no bio use		Bio use (only permissible with oil analysis[A])
	without oil analysis	with oil analysis[A] (optional)	
Liebherr Mineral oil	every 3000 h	every 6000 h	–[C]
Liebherr Hydraulic HVI			
Liebherr Hydraulic Basic 68			
Liebherr Hydraulic Basic 100			
Liebherr-PAO [B]	every 4000 h	every 8000 h	every 8000 h
Liebherr Hydraulic Plus			
Liebherr Hydraulic Plus Arctic			
Third party product - Mineral oil	every 2000 h	every 2000 h	–[C]
Third party product - Fully saturated synthetic ester	–[C]	–[C]	every 2000 h

Tab. 38: Oil change intervals

A) If the result of the oil analysis is positive, then oil may be used for a longer period. If the result of the oil analysis is negative, then the oil must be changed immediately.
B) PAO = Poly-alpha-olefin
C) Combination is not permissible

Bio use means that the use of biodegradable or environmentally friendly hydraulic oil is specified at the jobsite of the machine.

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Method	Determination of
Atomic Emission Spectroscopy (AES)	Wear metals, additives, contaminants: iron, chromium, tin, aluminium, nickel, copper, lead, molybdenum, silver, silicon, potassium, calcium, magnesium, borax, zinc, phosphorus, barium
FT Infrared spectroscopy (FT-IR),	Oil condition and contaminants: oil oxidation, glycol, water, nitrates, fuel, carbon
Viscosity	Viscosity test: viscosity at 40°C and 100°C: viscosity index - reference to lubricity and mixture
Analex PQ-Index	Magnetic metallic particles: statement regarding the quantity of collected magnetisable iron wear debris larger than 5 microns in oil

Tab. 49: Oil analysis data

Liebherr recommends that regular oil analyses be carried out by the company OELCHECK and that oil changes are performed on the basis of lab report (see also Service and product information).

A kit of sample bottles, sampling hose, sample documentation and protective envelopes for postage are available from Liebherr under following item codes:

– ID No.: 70 18 369 (12 units)
– ID No.: 70 18 368 (6 units)
– ID No.: 81 45 666, hand pump for taking samples (not included in kit.)

▶ Arrange for oil analysis to be carried out.

5.4.2 Take an oil sample on the hoist winch

Correct oil samples and analysis are an active component of a comprehensive maintenance program. The information which can be taken from an oil analysis allows the maintenance personnel to prevent cost intensive down time and dangerous failures with maintenance measures.

Early recognition of increased wear of components allow for planning of maintenance measures.

Just as significant as the degree of contamination are possible changes of the degree of contamination as compared to previous samples.

A high moisture content leads to the formation of acids, which can damage the internal components.

Silicate in the oil points to contamination and contaminated lubricant or improper maintenance.

to take oil samples

Make sure that the following prerequisites are met:
❑ The oil for the hoist winch is warm.
❑ The machine is in maintenance position.
❑ A suitable access aid is on hand.
❑ An appropriate container is available.
❑ The area of the drain plugs has been cleaned.

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5.7.2 Diesel engine: Check the arrangement and belly pans for contamination and clean

Ensure that following requirements are met:
❑ The machine is in the maintenance position.

Diesel engine configuration and belly pans

▶ Check the entire engine compartment for damage and contamination.

Diesel engine

NOTICE
Moisture penetrates electrical components!
Penetrating moisture causes contact corrosion and failure of test function.

▶ Do not expose electrical test sensors, such as oil pressure switches, to a direct jet of water or steam.

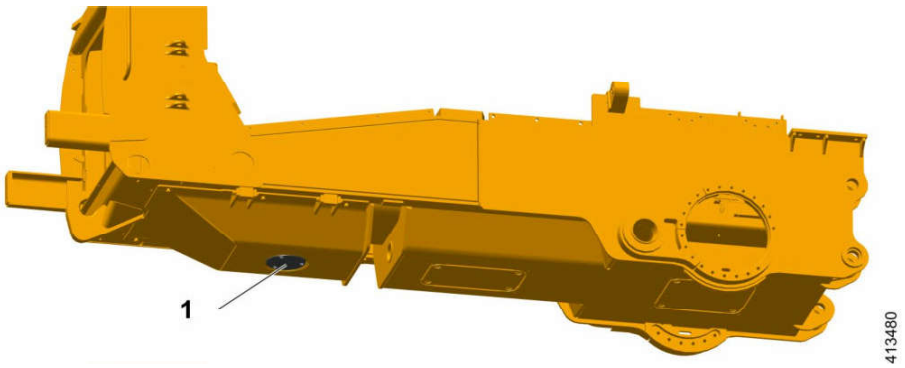

Fig. 463: Belly pan cover

▶ Undo screws on the belly pan cover **1** and remove belly pan cover **1**.

▶ If very dirty, clean engine and belly pans carefully with a steam cleaner.

▶ Install belly pan cover **1**.

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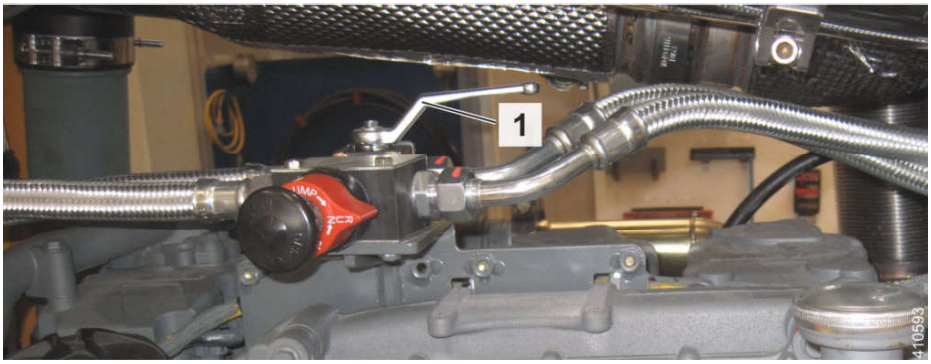

Fig. 479: Fuel system shut-off valve

▶ Open shut-off valve for the fuel system **1**.

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5.13 Heater, ventilation, air conditioning system

5.13.1 Check the air conditioning system

Proper function of the entire air conditioning system is only ensured if the maintenance tasks are carried out completely, diligently and properly by qualified personnel.

Only trained air conditioning mechanics may access and repair the coolant circuit.

The air conditioning system must be serviced once a year, if possible before the start of the summer season in an HVAC service station, otherwise any warranty becomes void.

5.13.2 Checking condenser for contamination and clean it, if necessary

Ensure that following requirements are met:
❑ A suitable access aid is on hand.

Fig. 494: Checking condenser for contamination and clean it, if necessary

▶ Check condenser for contamination.

▶ Clean the condenser with compressed air from the bottom to the top, if necessary.

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5.17 Cleaning the machine

5.17.1 Wet cleaning the machine

Notes for cleaning

NOTICE
During high pressure cleaning, electrical components, such as electronic boxes, refuelling pump, test value sensor and electrical components in the cab may be damaged!

▶ Do not expose the electrical components to a direct jet of water or steam.

NOTICE
During high pressure cleaning [more than 200.01 psi (200.15 psi)] freshly painted surfaces may be damaged!

▶ After delivery of the machine and before cleaning the machine, or parts of the machine, with high pressure cleaners, the paint should air dry for at least 30 days!

▶ Use only low pressure cleaners to wash the machine until the 30 days are up!

Cleaning the machine

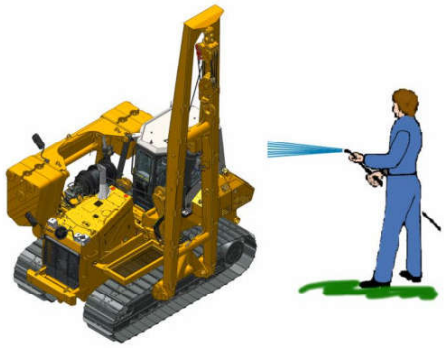

Fig. 506: Wet cleaning the machine

▶ Wet clean the machine.

▶ All lubricating points on the machine must be greased again.

Cleaning the diesel engine

NOTICE
Risk of damage to diesel engine and to associated electrical components due to moisture infiltration!

▶ Do not expose electrical components, such as starter, alternator, test value sensor and oil pressure switches to a direct jet of water or steam.

▶ Clean the diesel engine carefully.

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