en

Service Manual

Hydraulic excavator
R 9100 - R 9100B

from 26573

Document identification

Order number: 10361758

version: 02 / 2020

Valid for: R 9100 - R 9100B from 26573

Author: LEC - Technical documentation department

Product identification

Manufacturer: Liebherr-Mining Equipment Colmar SAS

Type: R 9100 - R 9100B

Type no.: 1132 / 1652

Conformity: CE

Address

Liebherr-Mining Equipment Colmar SAS
49 rue Frédéric Hartmann
CS 50038, F-68025 Colmar Cedex

LEC / en / version: 02 / 2020

copyright © Liebherr-Mining Equipment Colmar SAS 2020

LIEBHERR

CLICK HERE TO DOWNLOAD THE COMPLETE MANUAL

- Thank you very much for reading the preview of the manual.
- You can download the complete manual from: www.heydownloads.com by clicking the link below



- Please note: If there is no response to CLICKING the link, please download this PDF first and then click on it.

CLICK HERE TO DOWNLOAD THE COMPLETE MANUAL

Beginning with a material thickness of ¼" (8mm), butt welds must be made in several layers. The weld is applied in several beads. Wide butt welds are filled with several side beads, with the last layer covering the center. The electrode should melt evenly without creating burrs and peaks. The valley or crater, which is created when changing electrodes must be filled in and overlapped with the next electrode. To prevent cracks in those craters, care must be taken that they are properly filled.

If the crack extends towards the outer edge of the material (pos. C), slag may be trapped or burn holes may be created. To prevent this, the following aid may be used : tack a piece of sheet of metal to the outer edge of material.

The welding seam begins now at the sheet metal in the direction of the arrow (pos. C). After the welding is completed, the sheet metal is removed and the edge of the material is ground smooth. The weld must cool off slowly and should therefore be protected from rain and wind.

4.3.3 Reinforcement of the welding seam

If the crack of the material is due to an oveload or abuse, a reinforcement plate should be welded over the crack. The selection of the correct reinforcement plate is based on the construction and load factors of the component to repair.

For this reason, only general recommendations can be made as to the size and shape of the reinforcement plates.

4.3.4 General application of reinforcement plates

Shape of reinforcement plates

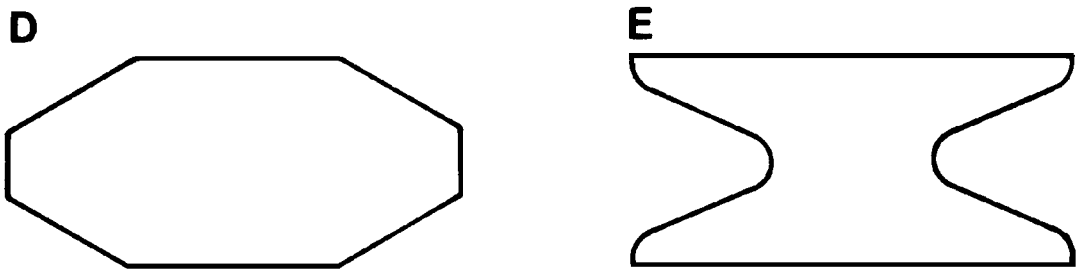


Fig. 5 *shape of reinforcement plates*

The crossover or connection between the reinforced and not reinforced part should be as gradual as possible. This means that the size of the plate should be selected in such a way that new or unacceptable high stress in the repaired parts are avoided. Plates with sharp corners (such as a rectangular plate) should not be used.

Suitable reinforcement plate with high tensile strenght (pos. D).

Suitable reinforcement plate against bending and alternating loads (pos. E).

Plate thickness

The thickness of the reinforcement plate should be up to 2/3 (66%) of the thickness of the material to be reinforced.

Plate quality

The yield and tensile strenght of the reinforcement plate should be equal to the material to be reinforced.

Plate installation

The welded area of the crack should be ground so it is a smooth and level.

LEC / en / Edition: 05 / 2016

copyright by
LIEBHERR

SWP 0.05.001 -R9100- Isolate machine for welding repairs

Step	Work procedure	Hazards identified	Precautions to be taken	Illustrations	Tools	Check Off
1	Isolate machine Follow SWP 0.02: Basic machine isolation				PPE	☐
2	Ensure that: machine is parked on flat surface	Mobile lifting devices may have trouble with uneven ground	Ensure that work area is flat, free of holes & rocks		Grader	☐

LEC / en / Edition: 11 / 2018

Note!
The LIEBHERR equipment is large and heavy. It is mandatory that all work be done in a safe manner.
If you are in doubt about a procedure, always check with your supervisor before proceeding.

copyright © Liebherr-Mining Equipment Colmar SAS 2018

Step	Work procedure	Hazards identified	Precautions to be taken	Illustrations	Tools	Check Off
3	Unbolt hose fitting Plug the hose	High pressure Oil projections Oil leak	Ensure that hydraulic pressure is exhausted Unbolt on the far side first Use oil spill kit Wear safety glasses and gloves Wear oil protecting clothings If the hose may be under pressure again (not disconnected at both end), plug with steel cap and seals bolted to the right torque. Else a plastic cap is sufficient to avoid oil leaking and dirt contaminating the inside of the hose.			☐
4	Remove the hose Store in a safe place, out of the way	Weight Slipping Crushing fingers Tripping	Require help as needed. Lift the hose if needed Clean as you work Wear safety gloves, keep fingers clear Avoid letting the hose slide on the ground when moving it.		PPE	☐

Note!
The LIEBHERR equipment is large and heavy. It is mandatory that all work be done in a safe manner.
If you are in doubt about a procedure, always check with your supervisor before proceeding.

LEC / en / Edition: 11 / 2018

copyright © Liebherr-Mining Equipment Colmar SAS 2018

Step	Work procedure	Hazards identified	Precautions to be taken	Illustrations	Tools	Check Off
22	Remove crane, manlift	Personnel injury when equipment is moving 	Keep visual contact with operator			☐
23	Restart Machine Test Operation	Personnel still working on machine Leaks Heavy equipment in movement	Ensure that ALL personnel clear Keep clear			☐
24	Clean Area Notify supervisor					☐

Note!
The LIEBHERR equipment is large and heavy. It is mandatory that all work be done in a safe manner.
If you are in doubt about a procedure, always check with your supervisor before proceeding.

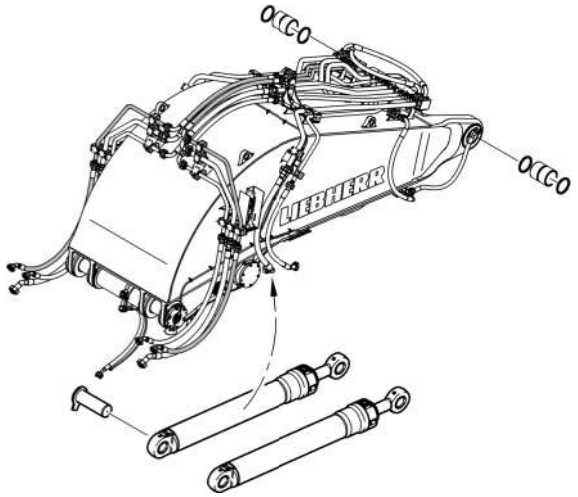
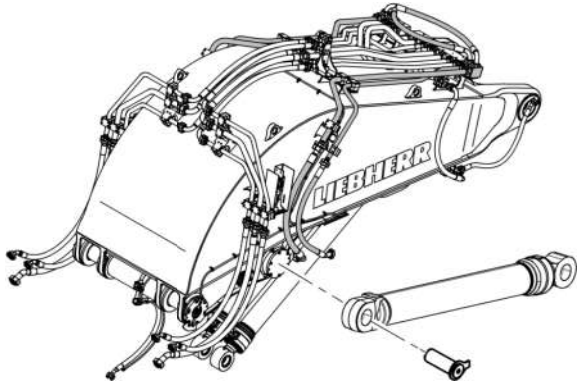
copyright © Liebherr-Mining Equipment Colmar SAS 2018

Step	Work procedure	Hazards identified	Precautions to be taken	Illustrations	Tools	Check Off
14	Remove both cylinder to deck pins using pin-puller and lift out.	Cylinder slipping Improper tool Pin slipping 	Ensure the cylinder is properly secured and the securing chain is taut. See tool listing in service manual for LEC tool ident Ensure tool is in good condition Use correct lifting procedures and equipment			☐
15	Remove both boom to deck pins using pin-puller and lift out	Boom moving Improper tool Pin slipping 	Do not stand under the boom Keep away from the area possibly affected by the boom. See tool listing in service manual for LEC tool ident Ensure tool is in good condition Use correct lifting procedures and equipment			☐

LEC / en / Edition: 11 / 2018

Note!
The LIEBHERR equipment is large and heavy. It is mandatory that all work be done in a safe manner.
If you are in doubt about a procedure, always check with your supervisor before proceeding.

copyright © Liebherr-Mining Equipment Colmar SAS 2018

Step	Work procedure	Hazards identified	Precautions to be taken	Illustrations	Tools	Check Off
5	Align in stick cylinder, rod secured. Fit pin using pin-puller Secure stick cylinder to boom.	Heavy equipment in movement Crushing Cylinder falling Improper tool 	Use cylinder stands. Keep clear of the load. Rest rod head on wedges See tool listing in service manual for LEC tool ident Ensure tool is in good condition		Pin-puller Cylinder stand Wedges	☐
6	Align in boom cylinders, rod secured. Fit pins using pin-puller Secure boom cylinder to boom.	Heavy equipment in movement Crushing Cylinder falling Improper tool 	Use cylinder stands. Keep clear of the load. Rest rod head on wedges See tool listing in service manual for LEC tool ident Ensure tool is in good condition		Pin-puller Cylinder stand Wedges	☐

LEC / en / Edition: 11 / 2018

Note!
The LIEBHERR equipment is large and heavy. It is mandatory that all work be done in a safe manner.
If you are in doubt about a procedure, always check with your supervisor before proceeding.

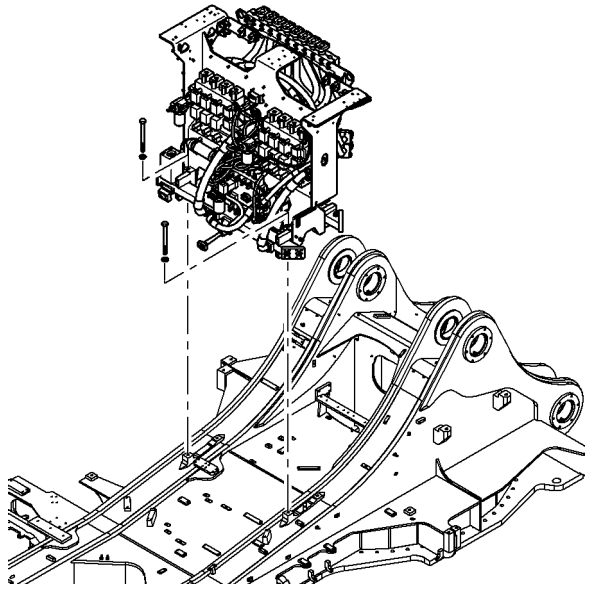
copyright © Liebherr-Mining Equipment Colmar SAS 2018

Step	Work procedure	Hazards identified	Precautions to be taken	Illustrations	Tools	Check Off
32	Re-fit electrical wiring, counter-weight, inlet and exhaust sys-tems, engine covers	Weight Falling Tripping Slippery Restricted area 	Use correct lifting tech-niqes and equipments Be aware of the missing panels and holes when fit-ting covers Keep worlk area clean			☐
33	Fill all fluid levels and bleed as necessary Charge air conditionning system	Slippery Spills	Clean as you work Wear PPE See Operating and main-tenance manual See Service manual		Spill kit	☐
34	Start the engine Test the machine	Personnel still working Noise Dust Moving objects	Ensure ALL personnel clear Wear PPE Start and Test according to maintenance instruc-tions			☐
35	Clean Area Notify supervisor					☐

LEC / en / Edition: 11 / 2018

Note!
The LIEBHERR equipment is large and heavy. It is mandatory that all work be done in a safe manner.
If you are in doubt about a procedure, always check with your supervisor before proceeding.

copyright © Liebherr-Mining Equipment Colmar SAS 2018

Step	Work procedure	Hazards identified	Precautions to be taken	Illustrations	Tools	Check Off
5	Unbolt valve bank & lift out Lower the valve-bank on the stand	Crushed fingers Heavy component in movement Crushing Valve bank swinging Valve bank toppling over 	Keep in contact with crane operator Keep clear Use ropes to prevent swinging Be carefull when lowering the valve-bank Ensure the valve bank is properly seated/secured on the stand		Ropes Stands	☐
6	Hook new valve-bank Lift new valve bank in place and bolt	Crushed fingers Heavy component in movement Crushing Valve bank swinging 	Use correct lifting procedures and equipment Keep in contact with crane operator Keep clear use ropes to prevent swinging		Ropes	☐

LEC / en / Edition: 11 / 2018

Note!
The LIEBHERR equipment is large and heavy. It is mandatory that all work be done in a safe manner.
If you are in doubt about a procedure, always check with your supervisor before proceeding.

copyright © Liebherr-Mining Equipment Colmar SAS 2018

Step	Work procedure	Hazards identified	Precautions to be taken	Illustrations	Tools	Check Off
15	Move the forklift from under the track and lower on ground	Heavy equipment in movement 	Keep clear			☐
16	Unstrap the track-roller Remove the track-roller from the forklift with crane	Heavy equipment in movement 	Keep clear			☐
17	Position and strap new track-roller on the forklift. Slide all the bolts in the roller bores.	Heavy equipment in movement Track-roller moving Crushing Bolt missing when mounting 	Keep clear Wear gloves The bolts cannot be positionned once the roller is on the forklift. Make sure to slide it in position before mounting on the forklift.			☐
18	Move the forklift under the track and lift the roller in position against the sideframe	Heavy equipment in movement Pinched fingers 	Keep clear Keep fingers clear			☐

LEC / en / Edition: 11 / 2018

Note!
The LIEBHERR equipment is large and heavy. It is mandatory that all work be done in a safe manner.
If you are in doubt about a procedure, always check with your supervisor before proceeding.

copyright © Liebherr-Mining Equipment Colmar SAS 2018

SWP 3.06.001 -R9100- Undercarriage exchange

Step	Work procedure	Hazards identified	Precautions to be taken	Illustrations	Tools	Check Off
1	Prepare for intervention Follow SWP 0.01: Safety check-list				PPE	☐
2	Remove Bucket Follow SWP 1.06: Face-shovel bucket exchange or SWP 1.07: Backhoe bucket exchange	Forget a step	Follow appropriate SWP carefully			☐
3	Remove Stick Follow SWP 1.08: Remove face-shovel stick or SWP 1.09: Remove backhoe stick	Forget a step	Follow appropriate SWP carefully			☐
4	Remove Boom Follow SWP 1.10: Remove face-shovel boom or SWP 1.11: Remove backhoe boom	Forget a step	Follow appropriate SWP carefully			☐
5	Remove counterweight Follow SWP 2.04: Remove counterweight	Forget a step	Follow SWP 2.04 carefully			☐

LEC / en / Edition: 11 / 2018

Note!
The LIEBHERR equipment is large and heavy. It is mandatory that all work be done in a safe manner.
If you are in doubt about a procedure, always check with your supervisor before proceeding.

copyright © Liebherr-Mining Equipment Colmar SAS 2018

2.4 Engine and oil cooler boxes / radiators

2.4.1 Engine cooler box (without engine radiator)

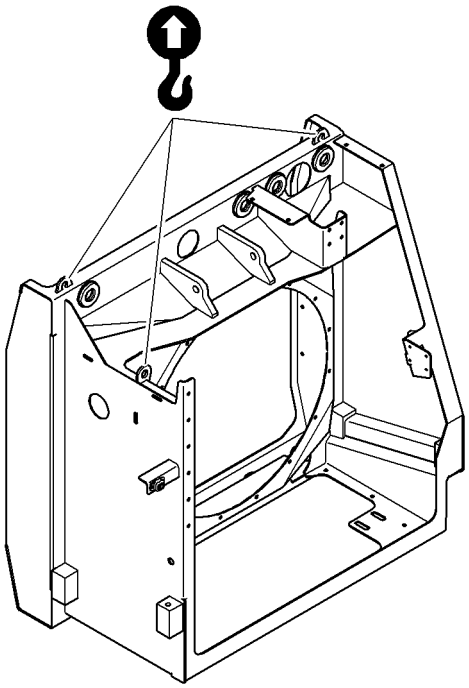


Fig. 2 *Lifting points of engine cooler box*

Weight: 418 kg

2.4.2 Engine radiator

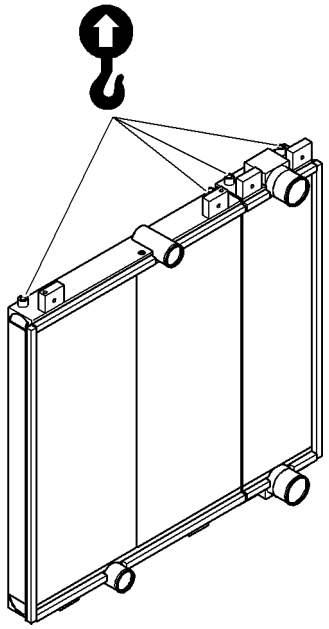


Fig. 3 *Lifting points of engine radiator*

Weight (empty): 186 + 85 = 271 kg

Thread of the lifting nut: M16 x 20

LEC / en / version: 07 / 2018

copyright © Liebherr-Mining Equipment Colmar SAS 2018

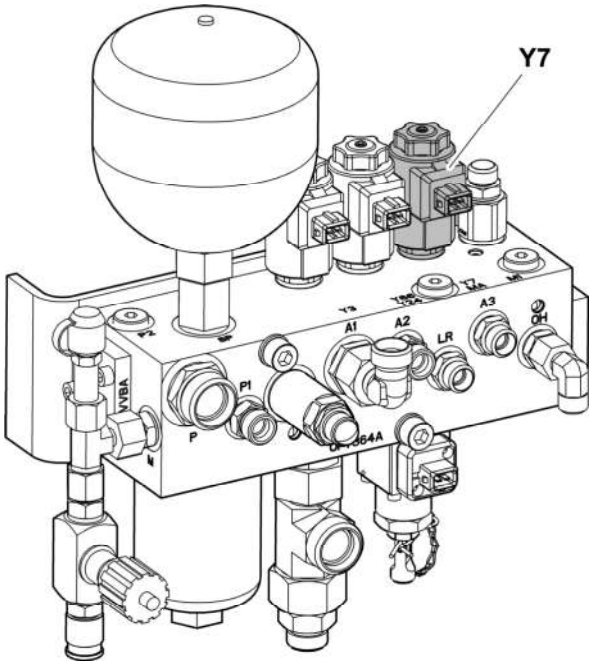


Fig. 9 *Solenoid valve Y7 on servo unit*

Y7 Solenoid valve swing brake

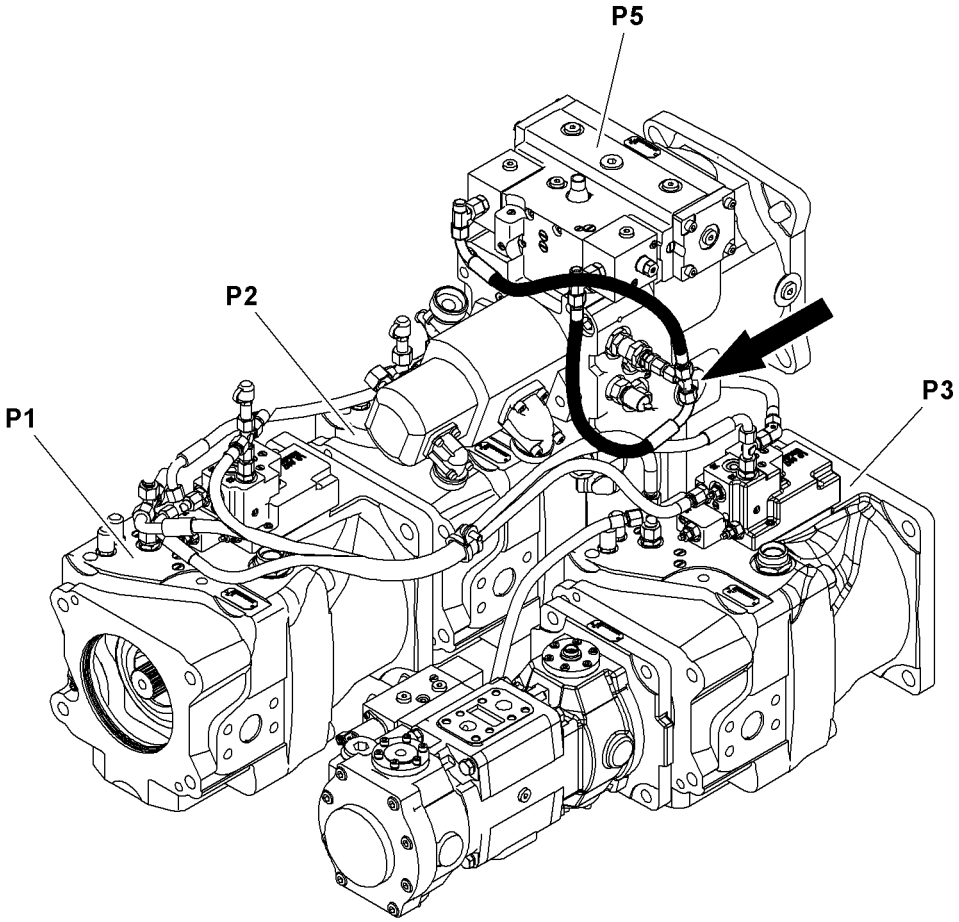
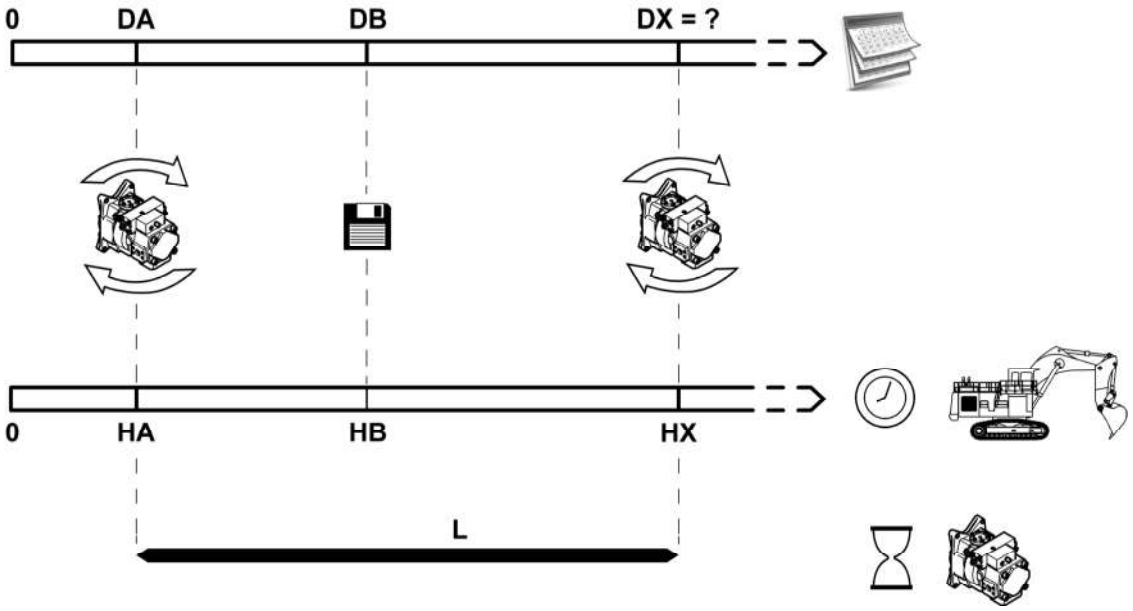


Fig. 10 *Hose of pressure cut-off valve on swing pump P5*

copyright © Liebherr-Mining Equipment Colmar SAS 2019

2 Calculate the next date you will replace a major component

In the section «Recommended intervals to replace the major components», the table gives an estimate of the life of major components. If you use the recommended intervals of the components and monitor the machine hours, you can calculate the date when you will need to replace the components.



Dates	**DA**	The last date when the component was replaced
	DB	The last date when the working hours of the machine were recorded
	DX	The next date when you will need to replace the component
Times	**L**	Lifetime of the component (hours)
Working hours of the machine	**HA**	Working hours when the component was replaced
	HB	Last recorded working hours
	HX	Working hours when you will need to replace the component
Other data	**AW**	Average working hours per day for the machine

The formula is:

$$\mathbf{DX} = \mathbf{DB} + \frac{\mathbf{L} - \mathbf{HB} + \mathbf{HA}}{\mathbf{AW}}$$

Example:

Component = rotary connection

Dates are written as «dd/mm/yyyy».

DB = 18/04/2015
HA = 32500 hours
HB = 33091 hours
L = 12000 hours
AW = 18 hours/day

$$\mathbf{DX} = 18/04/2015 + \frac{12000 - 33091 + 32500}{18} = 18/04/2015 + 633{,}83 \text{ days} = 11/01/2017$$

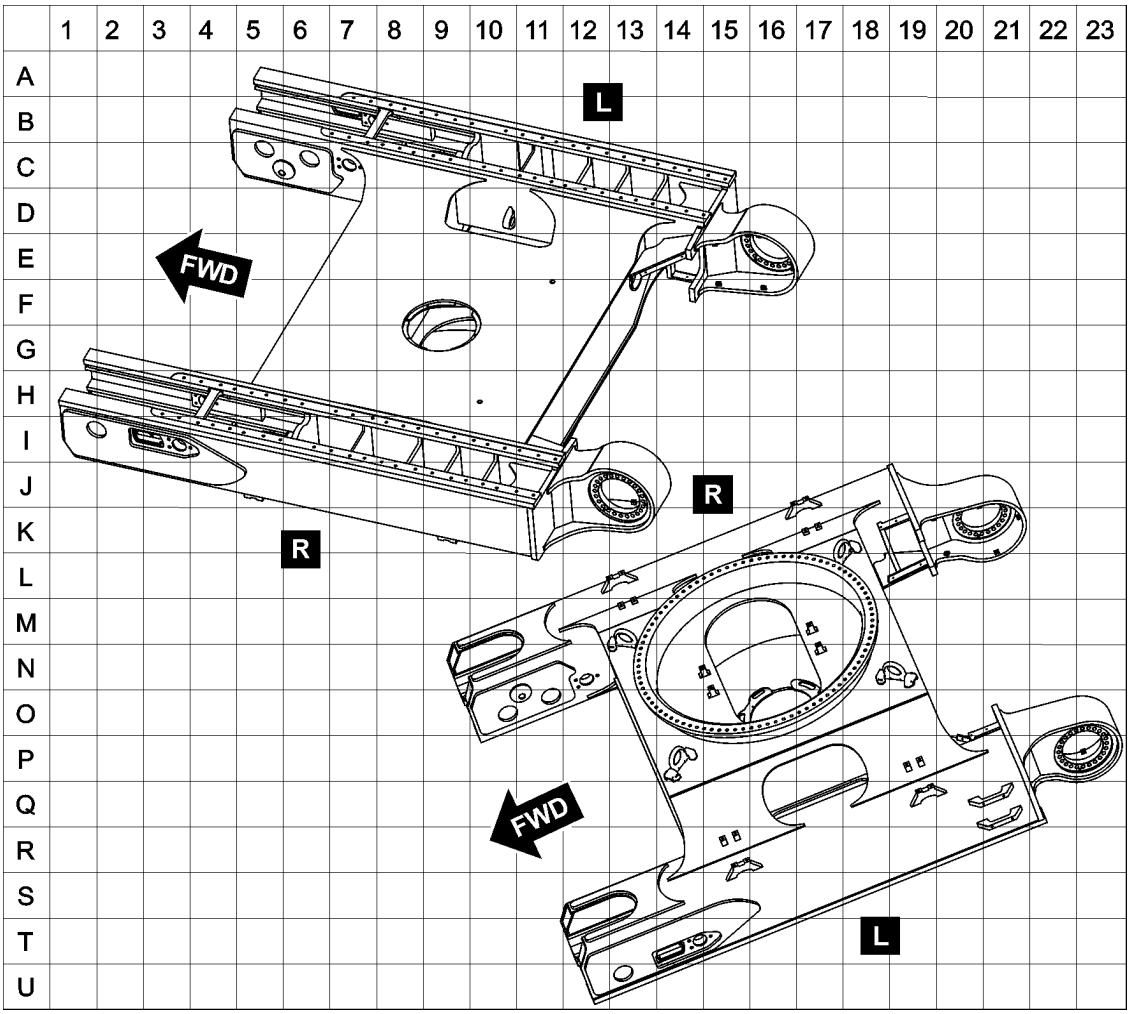
The date when you will replace the rotary connection is the 11/01/2017.

copyright © Liebherr-Mining Equipment Colmar SAS 2016

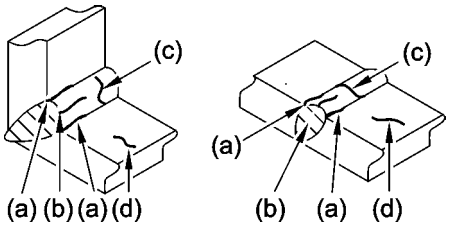
Machine serial N°:	Machine hours:	Travel hours:	Completed by:	Date:

Undercarriage	Article N°:		Index N°:	
	Serial N°:		Component hours:	

▶ Find the defect coordinates on the grid and report them in the following table.



(Mark the following options: location a, b, c or d; defect longitudinal, perpendicular to the seam direction and/or on the plate or in another position.

Defect coordinates	Side of the defect(s) R or L		Details of the defect(s): (a),(b),(c),(d) or other	Picture N°

Do a description of the defect(s):

LEC / en / version: 11 / 2017

copyright © Liebherr-Mining Equipment Colmar SAS 2017

1.4 Technical data

1.4.1 Working technical data

	Backhoe	Shovel
Maximum working slope*	5,0° - 9,0% (7,5 m^3)	5,0° - 9,0% (7,0 m^3)
Maximum travelling angle	23° - 42%	22° - 40%
Maximum tilt angle of Diesel engine	35°	35°
Working ambient temperature range	-12°C to +55°C Arctic packages in option***	-12°C to +55°C Arctic packages in option***
Noise emission**: • L_{pA} (inside cab) • Measurement uncertainty	 76 dB(A) 1,13 dB(A)	 76 dB(A) 1,13 dB(A)

Tab. 1-2 *Working technical data*

Machine with Extra Wide (EW) undercarriage	**Backhoe**
Maximum working slope*	5,0° - 8,7% (7,0 m^3)
Maximum travelling angle	25,2° - 47,1%
Maximum tilt angle of Diesel engine	35°
Working ambient temperature range	-12°C to +55°C Arctic packages in option***
Noise emission**: • L_{pA} (inside cab) • Measurement uncertainty	 76 dB(A) 1,13 dB(A)

Tab. 1-3 *Working technical data for machine with Extra Wide (EW) undercarriage*

* The maximum working slope has been determined for a hydraulic excavator in standard configuration (with bucket volume as given in the table above) with a material density of 1,8 t/m^3.

Changing the excavator configuration or the material density has an impact on the maximum working slope. In this case, LEC recommends contacting Customer Service in order to determine specific working conditions and the maximum working slope in particular.

The machine stability has been defined relative to a horizontal surface and taking into account a safety factor. Operating the excavator with a different configuration will reduce this safety factor. When working on slopes, it is not permitted to overload the bucket and to work with a material density different from that intended for the bucket provided by LEC.

In order to use the excavator in material handling operations, LEC recommends also contacting the Customer Service.

** The sound pressure level (L_{pA}) is determined according to ISO 6396. The measurement uncertainty is determined according to ISO 4871.

*** If installed, the optional arctic packages change the working ambient temperature range of the machine. In this case, a special information label in the cab indicates the

copyright © Liebherr-Mining Equipment Colmar SAS 2020

LIEBHERR-MINING EQUIPMENT COLMAR SAS

Gemäss ISO 9248 kann die Ausmessung von allgemeinen Massen, Inhalten und Leistungen der Maschinen zwischen von dieser Norm gegebenen Toleranzen abweichen.

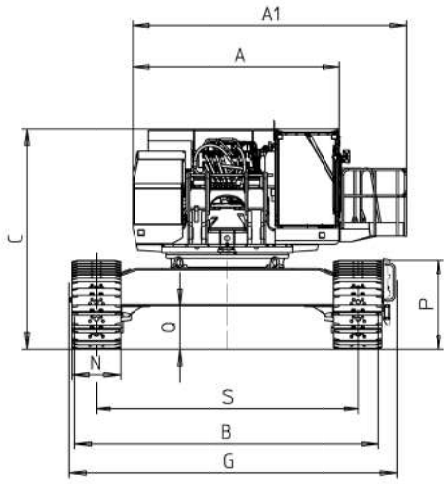
According to ISO 9248 , measurements of general machinery dimensions, performances and capacities may vary within tolerances given by this norm.

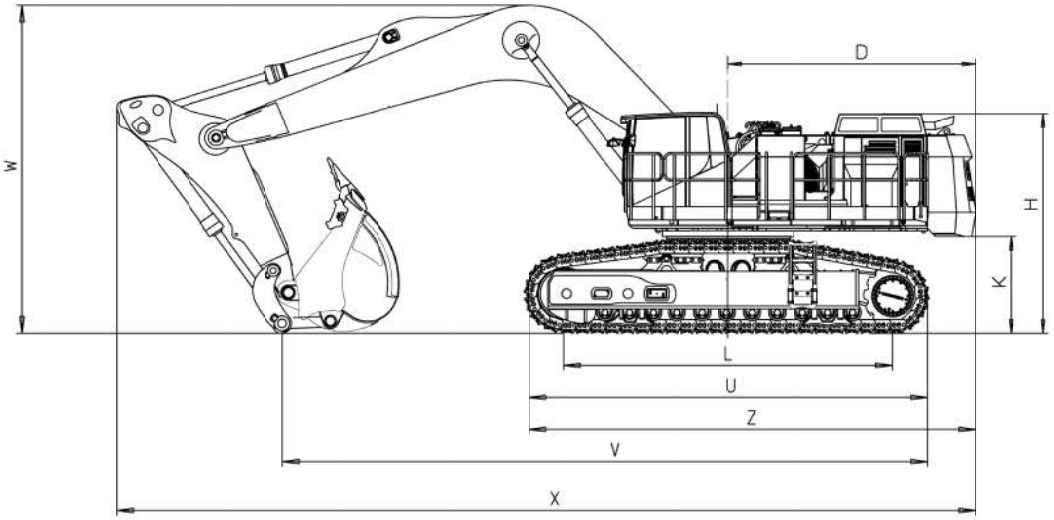
En accord avec la norme ISO 9248 , la mesure des dimensions, des volumes et des performances généraux des machines peut varier dans un intervalle de tolérance donné par cette norme.

INFORMATION :
unterliegt nicht dem Änderungsdienst,
Änderungen vorbehalten.

INFORMATION :
Right of modification reserved
Not sujected to be updated

INFORMATION :
n'est pas soumis à mise à jour,
modifications possibles sans préavis.





A = 3880 mm	N = 900 mm
A1 = 5150 mm	P = 1670 mm
B = 5685 mm	O = 810 mm
C = 4130 mm	S = 4900 mm
D = 4630 mm	U = 7460 mm
G = 6140 mm	V = 12090 mm
H = 4110 mm	W = 6145 mm
K = 1810 mm	X = 16085 mm
L = 6166 mm	Z = 8360 mm

900 mm BODENPLATTE
900 mm FLOOR PLATE
PATINS DE 900 mm

MONOBLOCKAUSLEGER
GOOSENECK BOOM 9200 mm
FLECHE MONOBLOC

LÖFFELSTIEL
STICK 3200 mm
BALANCIER

TIEFLOEFFEL
BACKHOE BUCKET R=2530 mm
GODET RETRO

R 9100 EW

Freimaßtoleranz / Tolerances not specified ISO 2768 1+T2 / Tolérance générale / Stahlbauteile "sehr grob" / Non-machined dimensions "very coarse" / Pièces mécano-soudées "très large"	Fertiggewicht / Weight / Poids: 0.0 kg	Modell od. Gesenk Nr. / Pattern or die No. / Modèle ou matrice N°: .	Bearbeitung/Finish/Usinage	.
Projektion / E	Datum / Date	Name / Nom		
Gezeichnet/Drawn/Dessiné	15-Mar-2018	KNUDSEN C.		
Geprüft/Inspected/Vérifié		BARTHER R.		
Normgepr./Inspected standards / Vérifié normes			Maßstab / Nominal dimens. / Cote tolérancée	Allgemeine Toleranz / Intervalle de tolérance
LIEBHERR WERK / FACTORY / USINE LEC	A1	Maßstab / Scale / Echelle 1:50	Werkstoff/Material/Matière: .	
Bezeichnung/Description/Dénomination: KINEMATIK / KINEMATICS / CINEMATIQUE			Zeichnungs Nr/Drawing No./N° de dessin: . 33 1652 1000 01 000	
Ersatz für/Replacement for/Remplace	Ersetzt durch/Replaced by/Remplacé par		Ident Nr./Ident No./N° d'ident.: 12198162	Blatt / Page / Feuille: 2 / 2

Diese Zeichnung darf ohne unsere Genehmigung weder kopiert noch vervielfältigt noch Dritten zugänglich gemacht werden. Zuwiderhandlungen verpflichten zu Schadenersatz und sind Sie Vorsatz strafbar. Alle aus Besitz dieser Zeichnung zu entnehmenden Informationen sind geheimzuhalten.
This drawing and all information contained herein are the property of Liebherr and their use is surrendered only in connection with the project for which they were provided. Neither this drawing nor the contents thereof shall be disclosed to any other party, for their use without the prior written consent of Liebherr. The use or disclosure of these drawings or the contents thereof for any other purposes is prohibited. anyone doing so will be held liable therefore.
Il est formellement interdit de reproduire par moyens que ce soient ou de donner à connaître à des tiers. Toutes les informations souvent être tenues secrètes. Les contrevenants s'exposent à une action en dommage et intérêt et même à des poursuites pénales.

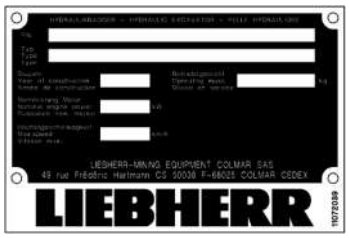


Plate 3: Typeplate LEC (Liebherr-Mining Equipment Colmar SAS)

This typeplate gives the following information:

- Product identification number.
- Type.
- Construction year.
- Nominal engine power.
- Max. speed.
- Operating mass*.



Plate 4: Typeplate LAM (Liebherr America)

This typeplate gives the following information:

- Type.
- Product identification number.

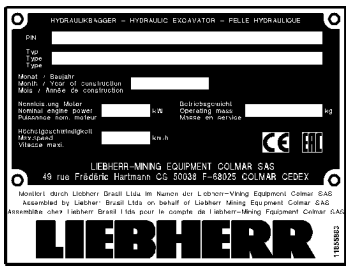


Plate 5: Typeplate LBR (Liebherr Brazil) "CE" / "EAC"

This typeplate gives the following information:

- Product identification number.
- Type.
- Construction month and year.
- Nominal engine power.
- Max. speed.
- Operating mass*.

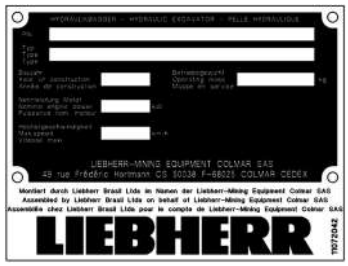


Plate 6: Typeplate LBR (Liebherr Brazil)

This typeplate gives the following information:

- Product identification number.
- Type.
- Construction year.
- Nominal engine power.
- Max. speed.
- Operating mass*.

* Estimated mass of the machine in its standard version (without optional equipment) according to its configuration: Diesel, electric, backhoe, shovel or pontoon.



Plate 20: Danger signal label

Indicates to stay out of the surrounding operating area in order to avoid severe injury.

copyright © Liebherr-Mining Equipment Colmar SAS 2020

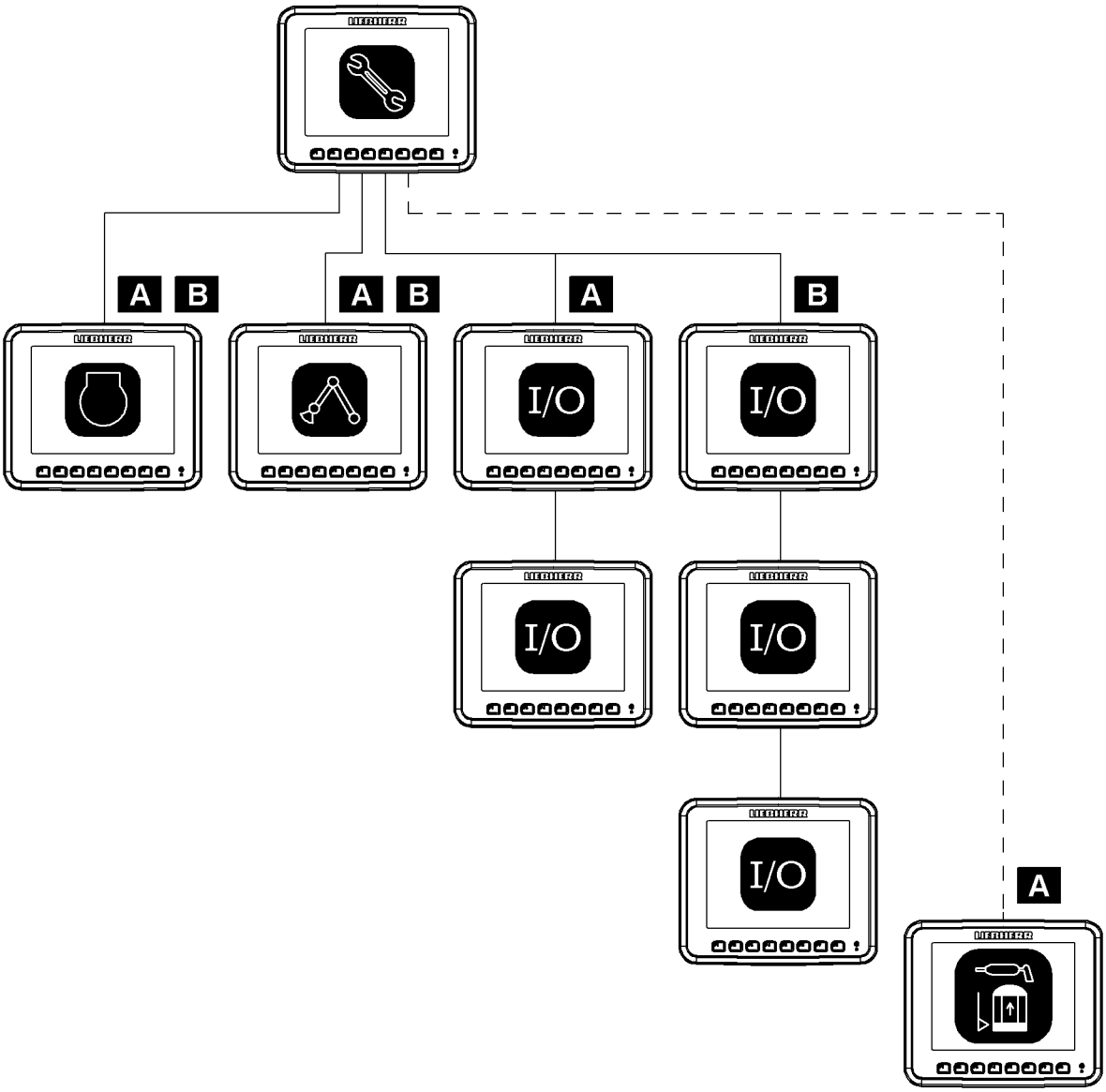


Fig. 3-15 *Submenus of the menu "Check"*

A Symbol mode
B Label mode

Submenus:

Engine This submenu shows in real time different parameters values of the engine.

Inputs Attachment This submenu shows the status of digital and analogical inputs of the machine attachment.

LEC/en/Edition: 02 / 2020

copyright © Liebherr-Mining Equipment Colmar SAS 2020

Caution!
For safety reason, the excavator can only be operated if the ladder is locked in its top position. This means that the swing and travel movements remain locked.

This safety measure can be momentarily by-passed by pushing and holding the button **S122** on the control board.

Depending on the machines, the cab control board can be different.

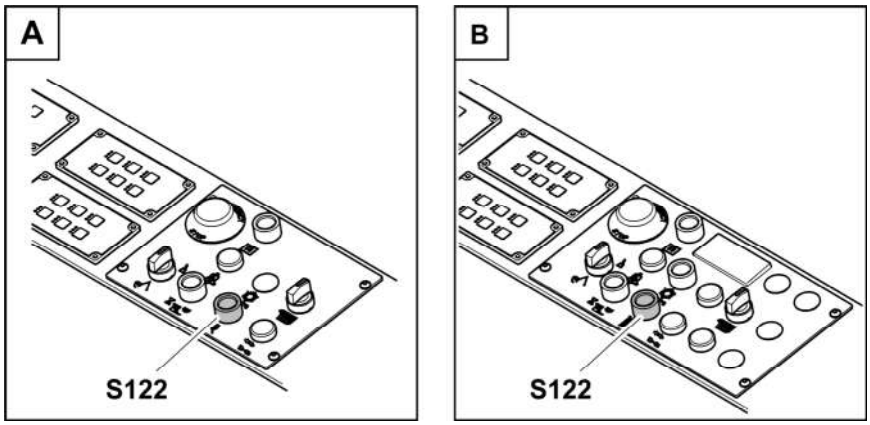


Fig. 3-24 *Button S122: Disable of ladder control position*

Move the 45° access ladder into lower position in case of emergency

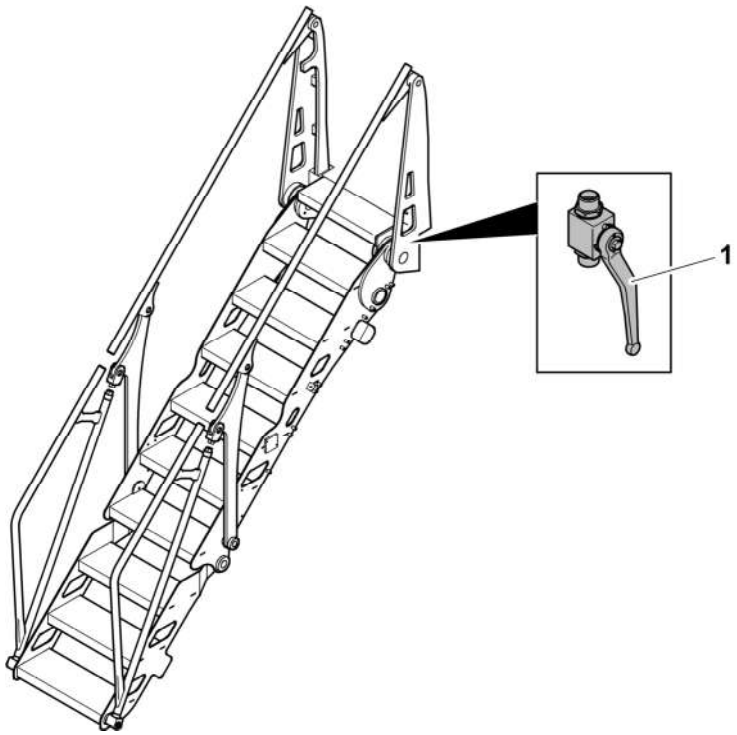


Fig. 3-25 *Emergency valve of access ladder*

1 Manual valve

In case of failure (service batteries out of order, defective solenoid valve or wiring, ...) of the access ladder moving procedure, an emergency valve is installed near the ac-

copyright © Liebherr-Mining Equipment Colmar SAS 2020

Note!
To prevent the starter motor and the battery from overloading, only switch on the air-conditioning after starting the diesel engine.

▶ If the machine is used for a longer period of time without using the air-conditioning unit, operate the compressor every 2 weeks by pressing the REHEAT button **6** (see Fig. 3-49).

Additional cab heater (optional)

An additional cab heater can be installed above the operator seat. Thus, in case of cold weather, it can improve the cab comfort during the machine operation.

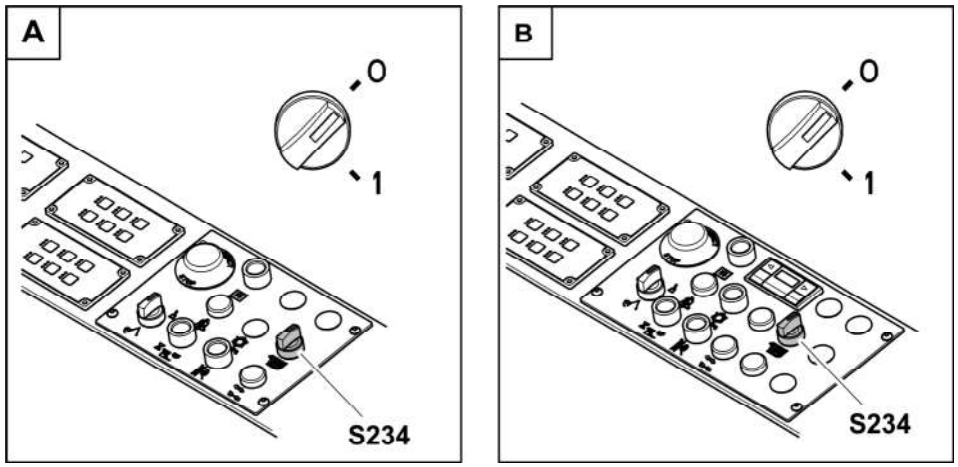


Fig. 3-52 *Rotary switch for additional cab heater*

S234 Rotary switch for the additional cab heater

Depending on the machines, the cab control board can be different.

▶ Start the Diesel engine.

▶ Use the rotary switch **S234** to start the additional cab heater.
↳ The temperature adjustment of this device is the same as the standard heating system.

▶ Use the rotary switch **S234** again to stop the additional cab heater.

Cab preheating system (optional)

The optional cab preheating system can start automatically, even if the machine is stopped. Thus, in case of cold weather, you can get a correct temperature in the cab before the start of the first shift.

The system has:
– a coolant heater
– an additional cab heater installed above the operator seat

Notes

To keep a safety level of the special batteries power (and of the principal batteries if applicable), the cab preheating procedure must take maximum 90 minutes.

▶ Take the maximum time above into account to set the cab preheating.

LEC/en/Edition: 02 / 2020

copyright © Liebherr-Mining Equipment Colmar SAS 2020

▶ Set the necessary operating time with the "**Previous**" or "**Next**" button.

▶ Push the "**Filled**" button to confirm the setting.

The coolant heater will automatically stop.

Start and stop the coolant heater automatically

▶ Go to the menu "**Program**".

▶ Select a program number.

▶ Push the "**Previous**" or "**Next**" button to select "**ON**".

▶ Push the "**Filled**" button.
↳ The automatic start and stop of the coolant heater is activated, with the parameters set in the sections above.

▶ Push the "**Previous**" or "**Next**" button to select "**OFF**".

▶ Push the "**Filled**" button.
↳ The automatic start and stop of the coolant heater is deactivated.

Caution!
The coolant heater current time and the recorded data will be erased if the preheating electrical system is opened.

▶ Let the circuit breakers of the preheating electrical system in position "**CLOSE**" to keep the data.

Thus, while the coolant heater is on or on standby, the special preheating batteries continue to supply the resistors for the heating of the electrical boxes.

▶ Monitor the state of charge of the special preheating batteries.

Warning lights

After the coolant heater start, Diesel engine coolant and block warm up. Thus, different warning lights are located on the cab control board to control this preheating. Depending on the machines, the cab control board can be different.

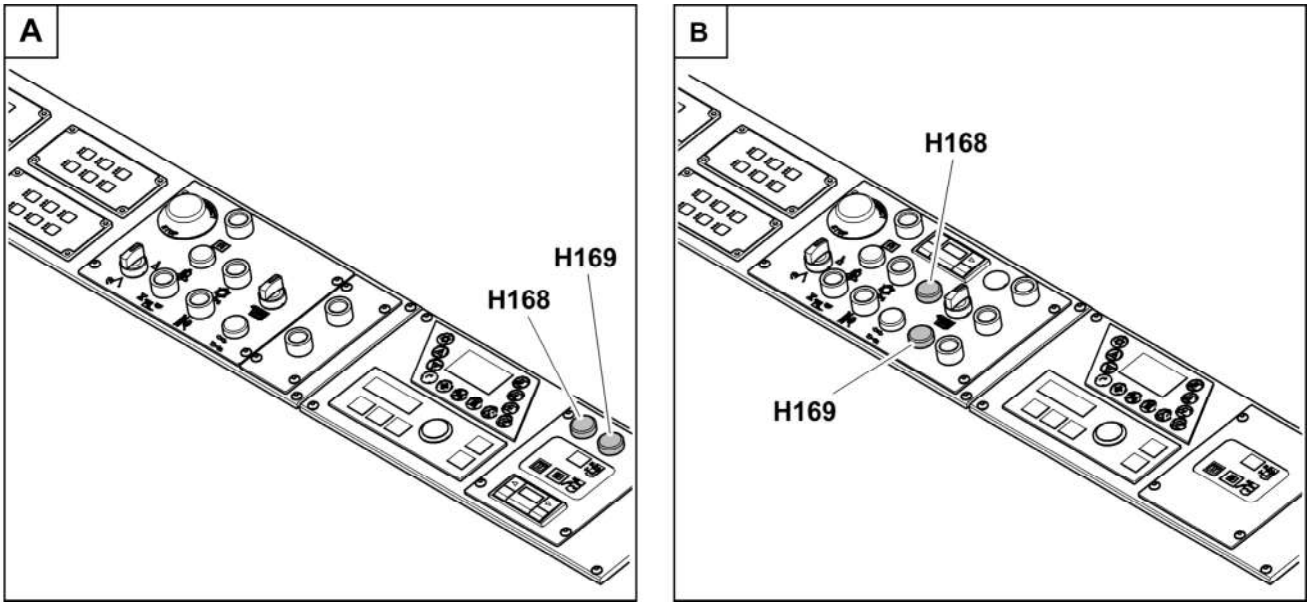
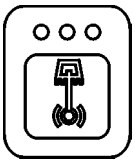


Fig. 3-71 *Warning lights of coolant preheating*

copyright © Liebherr-Mining Equipment Colmar SAS 2020



▶ Press "Swing brake" button on the keyboard.
  ↳ Swing brake is engaged.
  ↳ Uppercarriage is locked.
  ↳ First LED in the button comes on.

▶ Press button again.
  ↳ Swing brake is released.
  ↳ Uppercarriage is unlocked.
  ↳ First LED in the button goes out.

The swing brake is engaged if the safety lever is up or the access ladder is down (if installed) or the service trap is down (if installed).

In option, a buzzer can be activated in the cab if you operate the joystick to turn the uppercarriage while the swing brake is engaged.

Caution!
The brake only applies when the uppercarriage is near standstill and if no swing motion is actuated with the joystick.

To stop the uppercarriage when working on a slope:

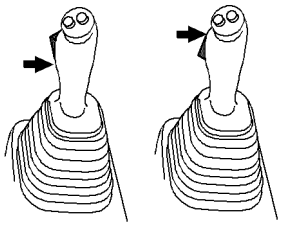
▶ Use the joystick to reduce the uppercarriage speed.

▶ Press "Swing brake" button to operate the swing brake.

▶ Move the joystick back to "0" position only after the brake operates.

Semi-automatic swing brake control (optional)

❑ Make sure that the swing brake does not operate.



▶ Tilt down the rocker switch **S57** on the right joystick handle.
  ↳ The semi-automatic control of the swing brake is on.

When the semi-automatic control of the swing brake is on:

– When the uppercarriage speed is less than a limit value:
  • The swing brake is applied.
  • The first and the second LEDs in the "Swing brake" button come on.
  • The swing brake symbol shows on the monitoring display.
– When the uppercarriage speed is more than the limit value:
  • The swing brake is released.
  • The first and the second LED in the "Swing brake" button go off.
  • The swing brake symbol disappears from the monitoring display.

▶ Tilt up the rocker switch **S57.**
  ↳ The semi-automatic control of the swing brake is off.
  ↳ The swing brake is released.

Caution!
The brake only applies when the uppercarriage is near standstill and if no swing motion is actuated with the joystick.

To stop the uppercarriage when working on a slope:

▶ Tilt down the rocker switch **S57**.

▶ Use the joystick to reduce the uppercarriage speed.

▶ Move the joystick back to "0" position only after the brake operates.

LEC/en/Edition: 02 / 2020

copyright © Liebherr-Mining Equipment Colmar SAS 2020

3.7.4 Excavator lifting and lashing operations

Danger!
For safety reasons, always consider the precautions given in this section.

Lifting precautions

Lift element:

- always checking and respecting the lifting configuration indicated on the corresponding transport drawing,
- only with the provided lifting appliances,
- with adequate and approved lifting devices of other kind (cables, chains, slings) if necessary,
- only after mounting the lifting appliances in accordance with the regulations,
- only at the declared threads or lugs shown on the assembly drawing,
- with the best possible equal load distribution,
- only being sure that the lifted element has been already dismounted,
- only after having drained tanks (hydraulic, fuel…),
- if no specific value is indicated on the corresponding transport drawing, always respecting the angles given on the sticker for lifting and lashing operations (refer to the description below).

Additional lifting precautions for backhoe buckets

When you lift the backhoe bucket, also obey the precautions that follow:

- Only use the lifting points shown in the stickers placed on the bucket.
- You can use the bucket teeth as lifting points.
- Be careful about the position of the center of gravity of the bucket.
- The bucket has two possible transport positions. The height B1 gives the correct transport position as shown in the transport drawing.
- If the height B1 is more than 3,6 m, turn over the bucket safely.

Additional lifting precautions for shovel buckets

When you lift the shovel bucket, also obey the precautions that follow:

- Only use the lifting points shown in the stickers placed on the bucket.
- Do not use the bucket teeth as lifting points.
- Do not use the welded beam to lift the bucket.
- Be careful about the position of the center of gravity of the bucket.

Lashing precautions

Lash element:

- always using necessary and appropriate devices or tools (e.g. elevating platform) in order to ensure safe lashing,
- always checking and respecting the lashing configuration indicated on the corresponding transport drawing,
- if no specific value is indicated on the corresponding transport drawing, always respecting the angles given on the sticker for lifting and lashing operations (refer to the description below),
- always ensuring a sufficient coefficient of friction (0,6 or higher) between load and

LEC/en/Edition: 02 / 2020

copyright © Liebherr-Mining Equipment Colmar SAS 2020

Fault / error	Cause	Solution
Fuel in the oil	Injection nozzle defective	Remove the injection nozzles. Replace defective injection nozzle and O-ring. Replace engine oil with engine oil filter. Store the dismantled injection nozzles in a clean receptacle containing clean diesel fuel. O-ring and seal of the injection nozzle must be replaced. Always replace the dismantled pressure pipe tube. The pressure pipe tube has a centring point and will fit in the cylinder head in one position only. Note: cleanliness: State-of-the-art components for the diesel injection nowadays are made of high-precision parts which are subjected to extreme stresses. Due to this high-precision technology, very high cleanliness must be observed when working on the fuel system, as even dirt particles measuring only 0.02 mm can cause components to malfunction and thus lead to engine damage.
	Fuel high-pressure pump defective	Replace fuel high-pressure pump
Cooling water in the fuel	Fuel tank contaminated	Clean the fuel system completely. Replace the fuel filter and bleed the fuel system
	Cylinder head defective	Replace cylinder head
Lube oil pressure insufficient	Lube oil pump defective	Replace the lube oil pump.
	Bearing clearance too great due to excessive wear or bearing damaged	Replace or reposition engine.
Lube oil in the cooling system	Oil cooler, oil cooler grill or seal leaking	Press out oil cooler, replace if leaking, replace seal
	Water pump for engine side leaking	Replace water pump
Cooling water in the lube oil	Oil cooler, oil cooler grate or seal leaking	Press out oil cooler, replace if leaking, replace seal.
	Water pump for engine side leaking	Replace water pump
	O-rings of the cylinder liners leaking	Remove cylinder liners and reseal
Oil in the fuel	Incorrect fuel in tank	Clean fuel system completely and replace fuel filter.
	Fuel low-pressure pump on the engine side leaking	Replace fuel low-pressure pump
	Fuel high-pressure pump defective	Replace fuel high-pressure pump
The Diesel engine oil consumption is too high	Engine leaking	Tighten screws, replace seals if necessary. The max. oil consumption is 0,5% from the fuel consumption.

LEC/en/Edition: 02 / 2020

copyright © Liebherr-Mining Equipment Colmar SAS 2020

Drilled anchor points

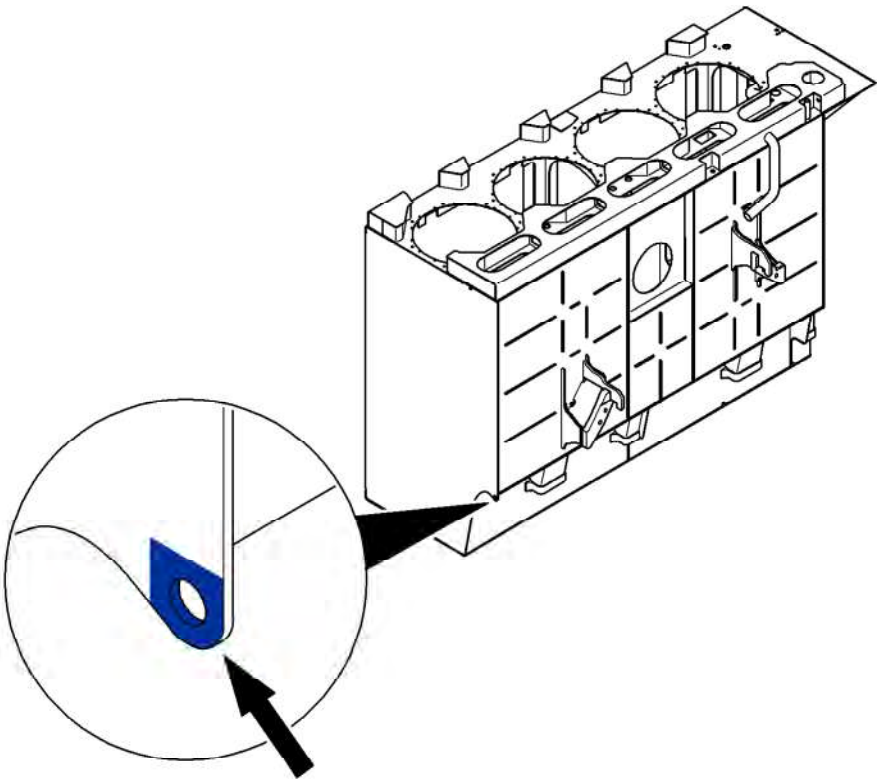


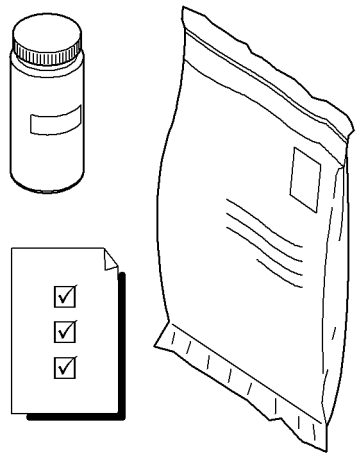
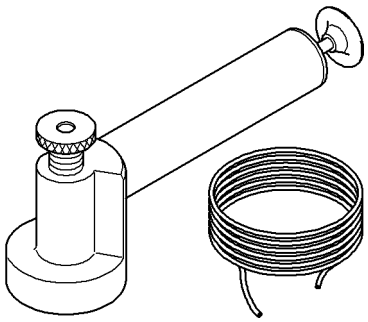
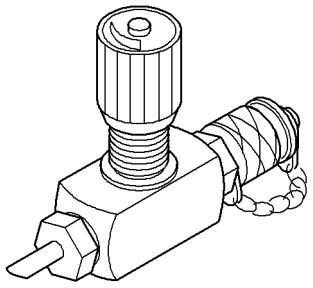
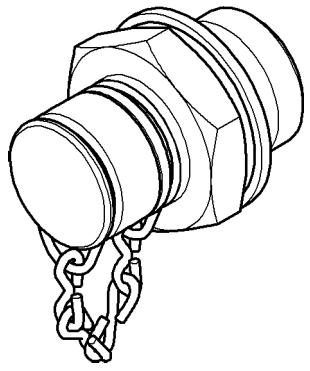
Fig. 5-5 Drilled anchor point (example)

5.3.2 Use the anchor points

- Before you use an anchor point, always do a check of its condition.
- If an anchor point has been used to arrest a fall, or if you are not sure about its safe condition, do not use this anchor point until it has been inspected and, if necessary, tested by a competent person.
- Always use the anchor points with applicable fall-arrest equipment.
- Use a harness with a maximum arrest force of 6 kN.
- Only attach to approved anchor points.
- Never attach more than three persons to a lifeline.
- Never attach more than one person to another type of approved anchor point. If several persons must attach themselves to the machine, they must use different anchor points.
- Never use an anchor point to attach parts or material.
- Persons who must work with fall-arrest equipment must be specially trained.
- All the anchor points and the tightening of the handrails mounting screws must be examined by authorized specialist personnel. For maintenance intervals, refer to the control and maintenance chart.

LEC/en/Edition: 02 / 2020

copyright © Liebherr-Mining Equipment Colmar SAS 2020

Ident Nr.	Description	Quantity	Illustration
8145660	Sampling kit for mineral and synthetic oils: – sample bottle – envelope addressed to OELCHECK GmbH – sample information sheet	1	
10029626		4	
7018368		6	
7018369		12	
7026817	Sampling kit for biodegradable oils: – sample bottle – envelope addressed to OELCHECK GmbH – sample information sheet	1	
7026088		6	
8145666	Sampling hand pump: – hand pump – sampling hose	1	
5613844	Sampling valve	1	
7019068		1	
	Compact sampling valve:		
12203274	– for hydraulic oil	1	
12203276	– for engine oil	1	
12203277	– for swing gear oil	1	
12203278	– for engine coolant	1	
12203279	– for splitterbox oil	1	

LEC/en/Edition: 02 / 2020

copyright © Liebherr-Mining Equipment Colmar SAS 2020

Fill the fuel tank

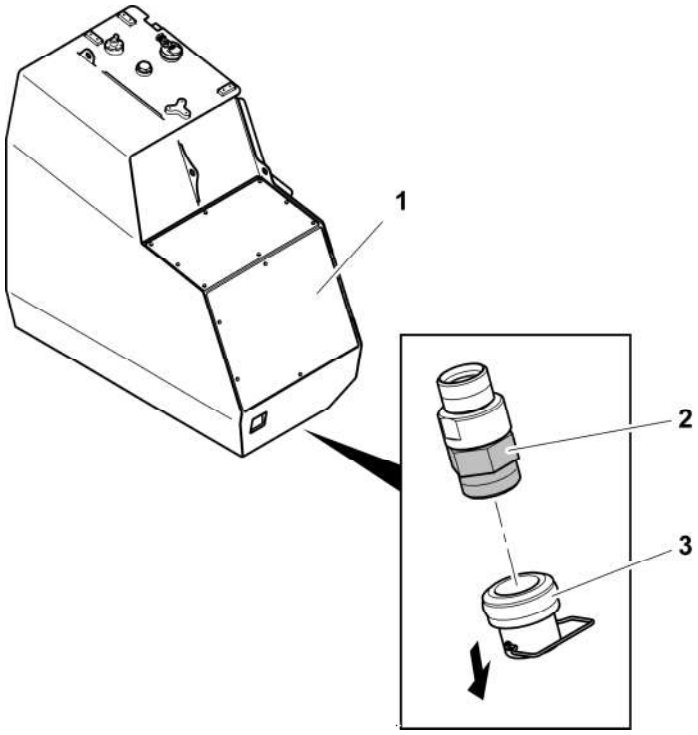


Fig. 5-41 *Fuel connection under the fuel tank*

1 Fuel tank
2 Fast fuel receiver
3 Receiver cover

- ▶ Remove the cover **3** from the fast fuel receiver **2**, which is installed below the fuel tank **1**.
- ▶ Plug the nozzle (fuel gun) to the receiver **2.**
- ▶ Add fuel until the system stops automatically.
- ▶ Install back the cover **3**.

5.10.2 Drain the fuel tank

A drain valve is located at the bottom of the fuel tank.

copyright © Liebherr-Mining Equipment Colmar SAS 2020

- ▶ Attach a drain hose on the bleeding valve **3**. Drain the water until water free oil flows out.
- ▶ Close the breather filter.

5.12.5 Hydraulic oil coolers

Cleaning hydraulic oil coolers is necessary to get optimum hydraulic oil cooling.

- ▶ Clean hydraulic oil coolers with compressed air or a steam cleaner at the intervals given in the control and maintenance chart, and more often if working conditions make it necessary.

5.12.6 Leak oil filter and return filter

The leak oil filter and the return filters are located on the top of the hydraulic tank.

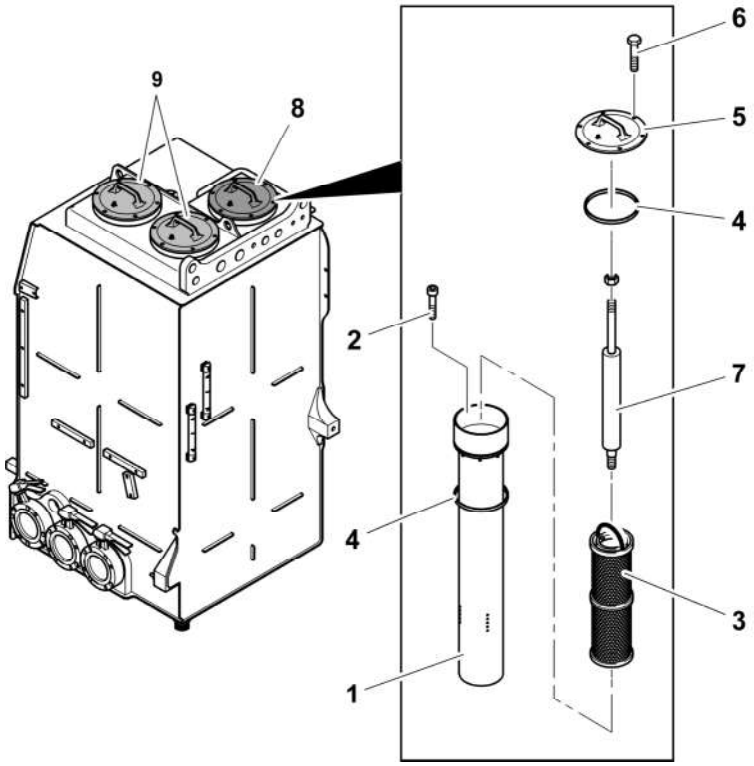


Fig. 5-66 *Oil filter parts*

1 Return pipe
2 Screw
3 Filter element
4 Seal kit
5 Cover
6 Hexagonal screw
7 Magnetic rod
8 Leak oil filter
9 Return filter

- ▶ Clean the magnetic rods **7** of the two types of filters at fixed intervals.
- ▶ Replace the filter element **3** at fixed intervals.

LEC/en/Edition: 02 / 2020

copyright © Liebherr-Mining Equipment Colmar SAS 2020

Change the oil of the Lifetime interspace (optional)

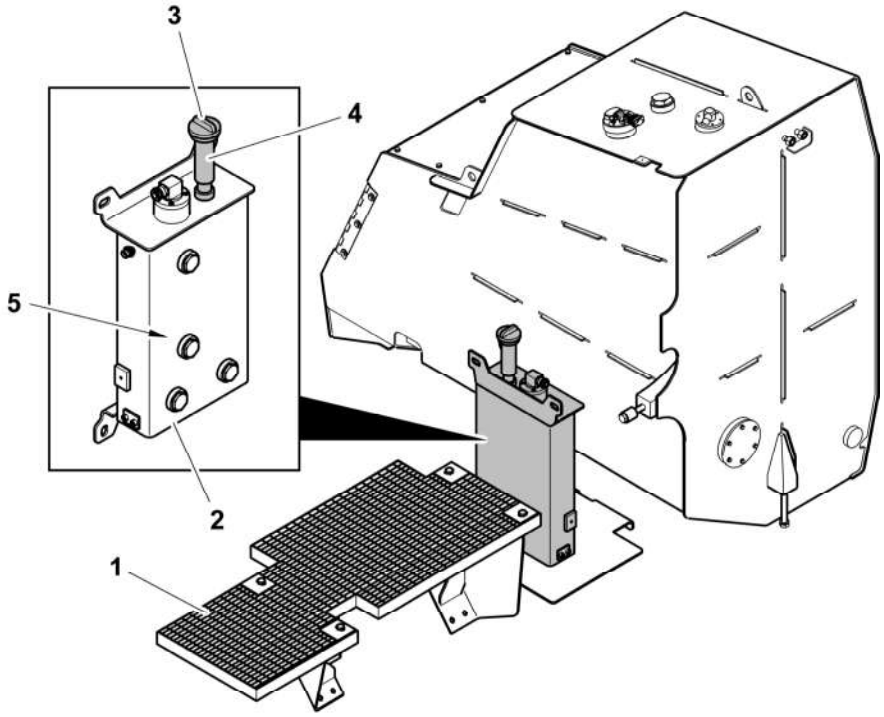


Fig. 5-89 *Special expansion tank of Lifetime interspace*

1 Rear cab grating
2 Expansion tank
3 Sealing cap
4 Oil filler neck
5 Sight gauges

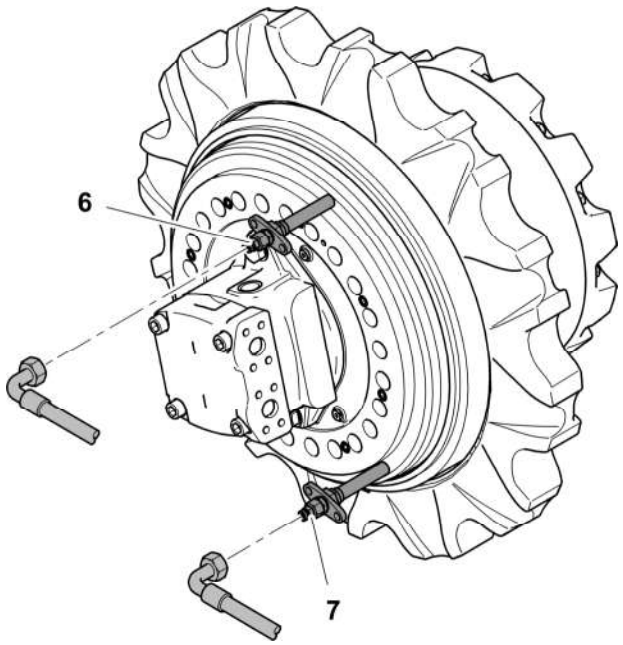


Fig. 5-90 *Oil change on the Lifetime interspace*

copyright © Liebherr-Mining Equipment Colmar SAS 2020

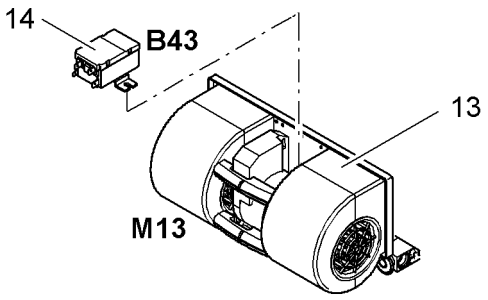


Fig. 5-116 *Fan motor in the heater*

13 Fan motor
14 Defrost thermostat

- ▶ Do a check of the function of the fan motor **13** (M13).
- ▶ Do a check of the function of the ventilation flaps on the heating / air-conditioning system.
- ▶ Do a check of the electric installation.
- ▶ Do a check of all hose fittings and couplings for leakage.
- ▶ Do a check of the defrost thermostat **14** (B43) in the evaporator (function, correct positioning and for damage).
- ▶ Do a check of the pressure switch on the dryer/receiver unit.

5.16.4 Additional cab heater (optional)

- ▶ If the additional cab heater is installed, refer to section "Starting aids" in chapter 5 for the maintenance to do.

5.16.5 Cab preheating system (optional)

- ▶ If the optional cab preheating system is installed, refer to section "Starting aids" in chapter 5 for the maintenance to do on:
- – the coolant heater
- – the additional cab heater installed above the operator seat

5.17 Cab pressurization (optional)

5.17.1 Aeration device (optional)

This optional aeration device is located on the rear top of the cab.

LEC/en/Edition: 02 / 2020

copyright © Liebherr-Mining Equipment Colmar SAS 2020

WORK TO BE PERFORMED DAILY Check ❑ for first and only interval *or* Check ❍ for repeat interval	Check	Initials	Comments
Diesel engine: Check running noises	❍		
Diesel engine: Check exhaust gas colour	❍		
Diesel engine: Check oil pressure and coolant temperature during operation	❍		
Electrical system: Clean and check LCD screen of the display for proper function when starting	❍		
Electrical system: Check indicator lights and gauges on the control panel when starting	❍		
Electrical system: Check for warning and fault messages on display (monitoring, grease, air conditioning, ...). If necessary refer to chapter 4 in the Operating Manual to identify and rectify faults and errors.	❍		
Cabin: Check if the safety lever is working properly	❍		
Cabin: Check the horn	❍		
Cabin: Check for green flash light on control module if fire fighting system is installed	❍		

WEEKLY CHECK THESE STEPS IN ADDITION TO THE DAILY REQUIREMENTS			
UPPERCARRIAGE			
Check level in reservoir for windshield washer, refill if necessary	❍		
CENTRALIZED LUBRICATION SYSTEM			
Perform the complete weekly maintenance given in the SKF / Lincoln Operating Instructions Manual	❍		
DIESEL ENGINE AND SPLITTERBOX			
Do a visual check of the precleaner	❍		
Do a visual check of the air intake hose for condition and leaks	❍		
Do a visual check and clean the radiator core and fan	❍		
Do a visual check of the radiator cap for leaks, replace if necessary	❍		
Drain off water and sediment at fuel tank	❍		
HYDRAULIC SYSTEM			
Clean magnetic rods of all return filters (weekly during the first 250 hours)	❑		
Do a visual check of the hydraulic tank breather filter, clean if necessary	❍		
ELECTRICAL SYSTEM			
Do a visual check of the head and floodlights, clean and adjust if necessary	❍		

copyright © Liebherr-Mining Equipment Colmar SAS 2020

WORK TO BE PERFORMED AT 2000, 4000, 6000 HOURS, ... Check ❑ for first and only interval *or* Check ❍ for repeat interval	Check	Initials	Comments
Sample and analyse hydraulic oil and change oil if necessary	❍		
Change hydraulic oil	❍		
Clean magnetic rods of all return filters	❍		
Clean magnetic rods of the leak oil filter	❍		
Replace filter element of the return filters	❍		
Replace filter element of the return filters (if hydraulic hammer is used)	❍		
Replace filter element of the leak oil filter	❍		
Replace the hydraulic tank breather filter	❍		
Replace the hydraulic tank breather filter (if hydraulic hammer is used)	❍		
Replace control oil filter element	❍		
Replace swing pumps replenishing oil filter elements	❍		
Replace the control valves high pressure filters, replace filter elements after each replacement or repair of a working pump and check the internal surface of the filter housing	❍		
Do a visual check of the oil cooler protection filters, clean or replace if necessary (optional equipment)	❍		
Replace filter elements of bypass filter (optional equipment)	❍		
Do a detailed check of the oil coolers, clean if necessary	❍		
Do a visual check of the cooling fan blades, replace if necessary	❍		
Check and adjust primary and secondary pressure relief valves	❍		
Do a detailed check of mounting of components (pumps, motors, ...)	❍		
Every 4000 hours (or at least once a year), all hydraulic pumps must be checked and adjusted by trained and qualified Liebherr personnel	❍		
Every 10000 hours, replace following high pressure (HP) hoses: – all HP hoses between work pumps and valve banks, – all HP hoses of the swing circuit: • all HP hoses between swing pumps and swing motors, • all pressure equalizing hoses between swing pump / swing motors circuits, • all HP pilot hoses of the swing pumps regulation, – all HP hoses of the oil cooler fan drive circuit, including HP pilot hoses, – all HP hoses of the water cooler fan drive circuit, including HP pilot hoses.	❍		
ELECTRICAL SYSTEM			
Do a visual check of the head and floodlights, clean and adjust if necessary	❍		
Press to open dust discharge valve on aeration devices for cabin and electrical boxes (optional equipment)	❍		
Replace main element on aeration devices for cabin and electrical boxes (at least once a year) (optional equipment)	❍		

LEC/en/Edition: 02 / 2020

copyright © Liebherr-Mining Equipment Colmar SAS 2020

Oil intake and oil replenishing circuit

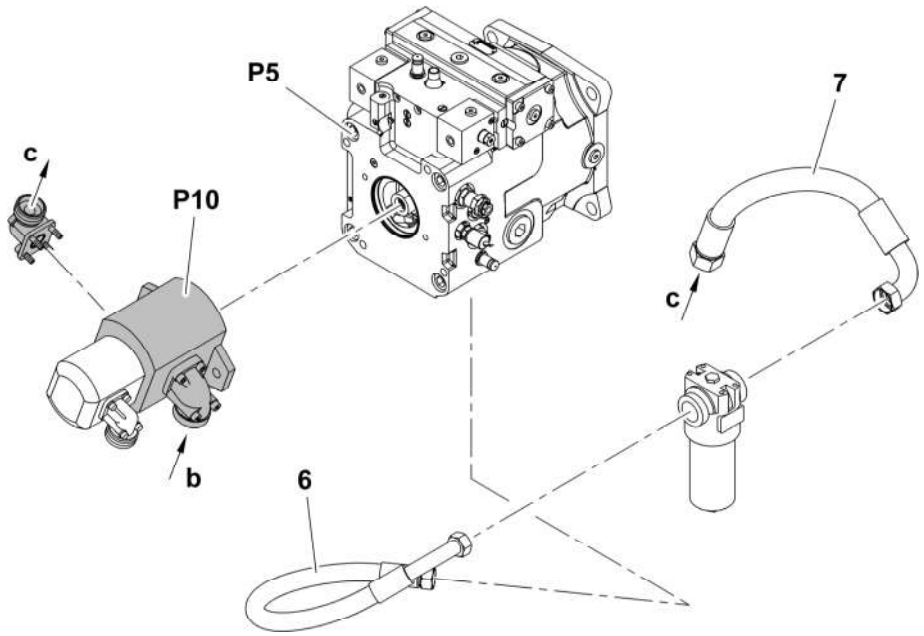


Fig. 6-16 *Intake and replenishing hoses*

6	Hydraulic hose	**P5**	Swing pump
7	Hydraulic hose	**P10**	Replenishing oil pump
b	Refer to section "Oil intake circuit" of the working pumps		

- ▶ Disconnect, drain and clean all the hydraulic hoses.
- ▶ Clean the hydraulic tank (refer to the related section).
- ▶ Do the restart procedure before you put the machine in operation (refer to the related section).

6.2.7 Cooling pumps circuit

Return oil circuit

- ▶ Refer to sections "Return oil circuit" and "Return lines on VB2" of the working pumps.
- ▶ Move to next section about the leak oil circuit.

copyright © Liebherr-Mining Equipment Colmar SAS 2020

1 Guidelines

As you read these instructions, you will notice a number of depictions and symbols which are to facilitate the navigation and understanding of these instructions.

For reasons of better legibility, in these instructions we mainly use the male form for general references. Of course, the female form is also always intended.

Please read these instructions thoroughly and heed the warning and safety notes. Please observe the warning and safety notes and exercise particular caution in these cases.

Inform also other users accordingly.

Text representations	Meaning
Bold print	Highlighting of particularly important words or passages
• List 1	Marks lists
○ List 2	Marks lists
(parenthesis)	Item numbers
➢ Instructions	Instructions to personnel. These always appear in chronological order.

1.1 Explanation of symbols and signs

Activities which generate actual hazards (to life and limb or possible damage to the material) are marked by warnings. Definitely observe the instructions given in the warnings.

You will find these symbols, which warn of specific dangers to persons, material assets, or the environment, next to all safety instructions in these operating instructions.

Please read these instructions thoroughly and heed the warning and safety notes. Please observe the warning and safety notes and exercise particular caution in these cases.

Inform also other users accordingly.

The following warnings are possible.

Warning level		Consequence	Probability
	**DANGER**	Death/ serious injury	imminent
	**WARNING**	Serious injury	possible
	**CAUTION**	Minor injury	possible
	**ATTENTION**	Property damage	possible

LEC / en / Edition: 09/2018

Copyright © Liebherr Mining Equipment Colmar SAS 2018

8 Technical data and operating instructions

8.1 Operating pressure / operating temperature

All system components must be designed for the maximum operating pressure and must be secured by an adequate pressure relief valve against too high system pressures. For details see operating or installation instructions and data sheets of the respective product.

8.2 Installation position, sound pressure level, weight, dimensions

For details see operating or installation instructions and data sheets of the respective product.

8.3 Tightening torques

For details see operating or installation instructions and data sheets of the respective product.

8.4 Output / connections

For details see operating or installation instructions and data sheets of the respective product. Deviating conditions such as NLGI class, temperature and counter pressure may lead to a deviation in the flow rate. This should be taken into account when designing the lubrication points.

8.5 Filling possibilities

For details see operating or installation instructions and data sheets of the respective product.

8.6 Electrical connection (electrically driven products)

Following the respective applicable installation prescriptions for electrical systems. For details see operating or installation instructions and data sheets of the respective product.

IP type of protection

Motor and system:
For IP or NEMA protective class see type identification plate of motor or system respectively the Technical Data chapter of the individual components. For details see operating or installation instructions and data sheets of the respective product.

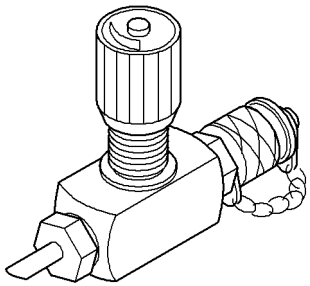
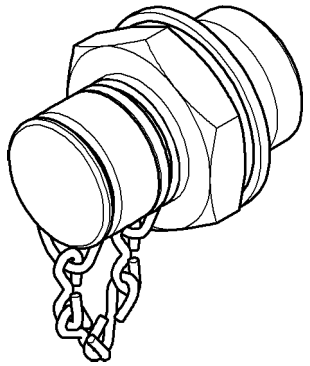
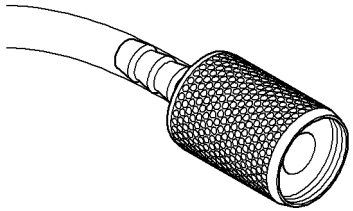
8.7 Air pressure and air quality (air-operated products)

Filtered and oiled air according to DIN ISO 8573-1 not higher than class 5

Inlet air pressure	5.5 – 7 bar
Maximum particle density	10 mg / m^3
Water content (pressure dew point)	+ 7 °C
Oil content (maximum oil concentration)	25 mg / m^3

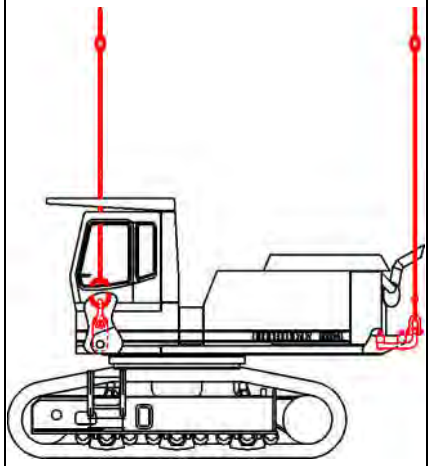
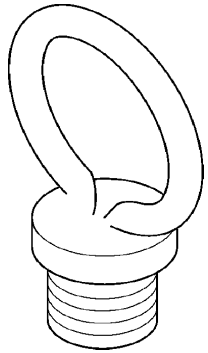
Please follow the instructions of the respective product.

Copyright © Liebherr Mining Equipment Colmar SAS 2018

Representation	No.	Description	Size	Order No.	Model										Application
					R9100	R984C	R9150	R994	R9200	R9250	R994B R9350 R9400	R995	R996 R996B	R9800	
	81 82	Sampling valve Sampling valve Compact sampling valves		5613844 7019068	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	Used to take samples for oil analysis.
	83 84 85 86 87	Sampling valve Sampling valve Sampling valve Sampling valve Sampling valve		12203274 12203276 12203277 12203278 12203279	X X X X X	X X X X X	X X X X X	X X X X X	X X X X X	X X X X X	X X X X X	X X X X X	X X X X X	X X X X X	For hydraulic oil. For engine oil. For swing gear oil. For engine coolant. For splitterbox oil.
	88	Fitting for sampling hose		12203794	X	X	X	X	X	X	X	X	X	X	For compact sampling valves.

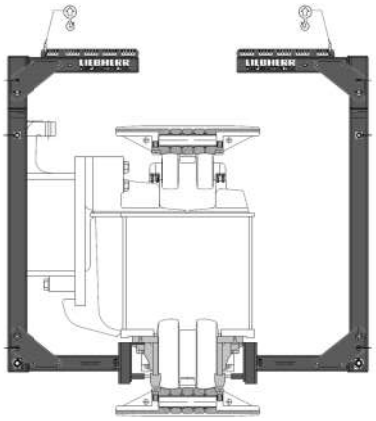
LEC / en / version: 04 / 2018

copyright © Liebherr-Mining Equipment Colmar SAS 2018

Representation	No.	Description	Size	Order No.	Model										Application
					R9100	R984C	R9150	R994	R9200	R9250	R994B R9350 R9400	R995	R996 R996B	R9800	
	555	Basic machine lifting tool without lifting ropes		9756615		X									For the lifting of the complete uppercarriage and undercarriage without the counterweight and the attachment.
	560 562 564 565 566 567 568 569	Lifting eye Impact screw Impact screw Impact screw	M20x2.5 M24 M36x4 M48x5 M68x6 M36 M48 M68	4900313 8566100 4900491 4900835 4902077 9103255 95689958 9568957	X X	X X	X X	X X	X X X X X X X	X X X X X X X	X X X X X X X	X X X X X	 X X X X	 X X X X	For the lifting of different components of the excavator.

LEC / en / version: 04 / 2018

copyright © Liebherr-Mining Equipment Colmar SAS 2018

Representation	No.	Description	Size	Order No.	Model										Application
					R9100	R984C	R9150	R994	R9200	R9250	R9400 R9350 R994B	R995	R996 R996B	R9800	
	950	Chain guide mounting tool (pump lifting tool not included)		11477039									X	X	
	960	Swing bearing lifting tool		11474186						X	X	X	X	X	

LEC / en / version: 04 / 2018

copyright © Liebherr-Mining Equipment Colmar SAS 2018

2 Cooling system

The cooling liquid is thermostatically controlled and its circulation is operated by a related water pump.

Each cylinder unit is cooled individually through the distribution channels cast in the crankcase.

The pistons are cooled through the cooling duct from the lubricating oil circuit of the Diesel engine.

2.1 Cooling schematic

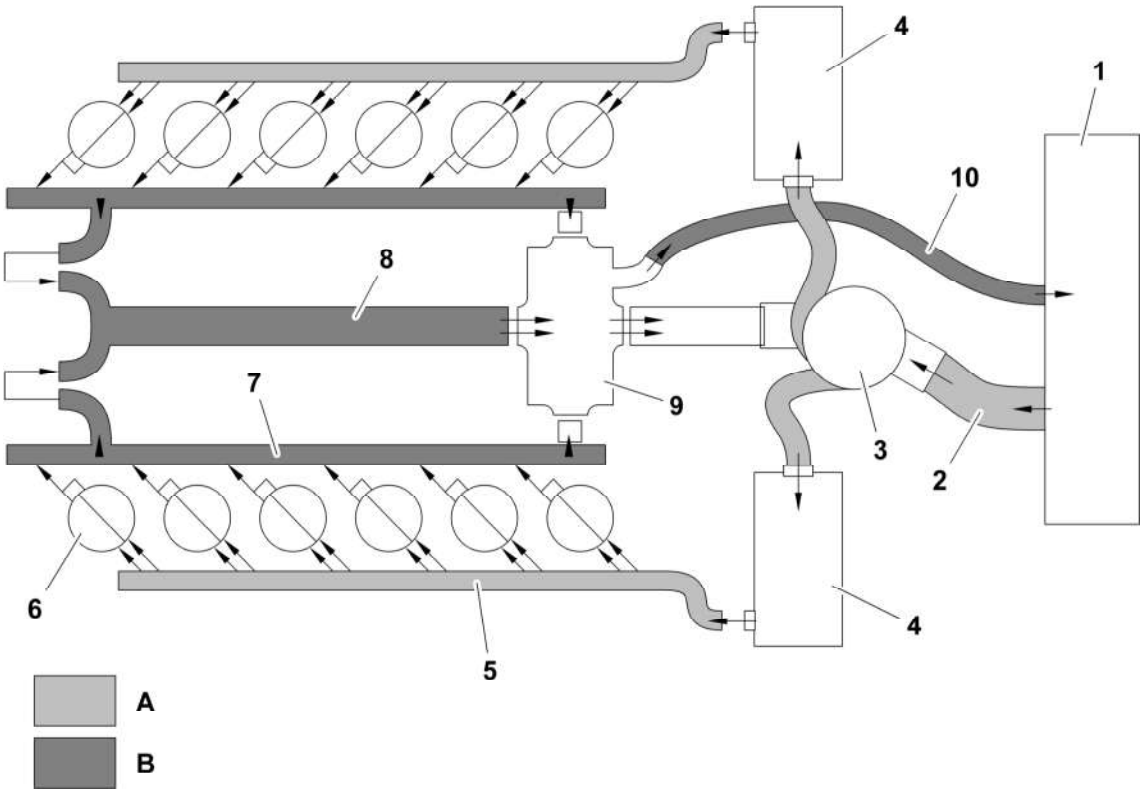


Fig. 2 *Cooling system diagram*

1 Coolant cooler / radiator
2 Coolant inlet to the engine
3 Engine water pump
4 Oil cooler
5 Coolant distributor rail
6 Cylinder head / line
7 Coolant collector rail
8 Coolant return to the thermostat
9 Thermostat
10 Coolant outlet to the radiator
A Supply from radiator
B Return from engine

LEC / en / version: 05 / 2019

copyright © Liebherr-Mining Equipment Colmar SAS 2019

3.4.5 Start the engine after the fuel system bleeding

With fuel prefilter with remote pump

- ▶ Start the engine.
- ▶ Operate it at low idle for approximately 10 minutes.

With fuel prefilter with integrated pump

- ▶ Start the engine.
- ▶ Operate it 1800 RPM idle for approximately 10 minutes.
- ▶ Stop the engine. Wait 2 minutes.
- ▶ Start the engine again.

If the engine does not start in less than 5 seconds:

- ▶ Do the bleeding procedure of the fuel system again.

LEC / en / version: 05 / 2019

copyright © Liebherr-Mining Equipment Colmar SAS 2019

Solenoid valves function

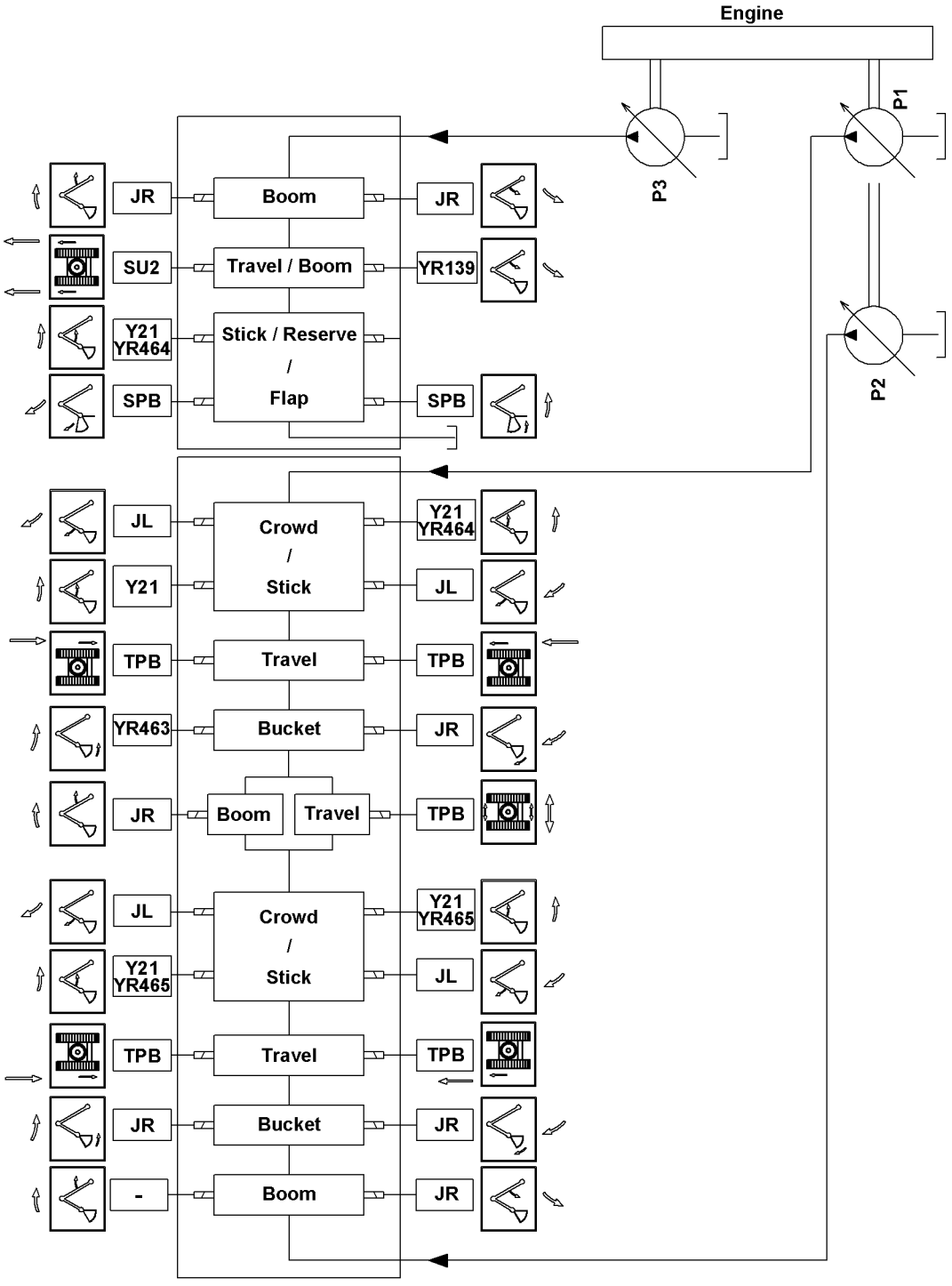


Fig. 16 *Solenoid valves*

3.2.4 Damping system for backhoe attachment

The machine has special damping systems to stop the movement of the attachment before the cylinders get suddenly the end position of the piston rods. Depending on the cylinders, this end stroke management can be done with:

– special devices integrated into the cylinders
– a movement cut-off

copyright © Liebherr-Mining Equipment Colmar SAS 2019

P1	Working pump 1	**VB1**	Control valve block 1
P2	Working pump 2	**VB2**	Control valve block 2
P3	Working pump 3	**YR463**	Reg. solenoid valve bucket tilted in

5.5 Shovel tilt cylinders for shovel attachment

One extremity of the two shovel tilt cylinders **CBT1** and **CBT2** is attached on the boom, the other extremity is attached on the shovel. Thus, the shovel bucket stays in a constant position to the ground when you extend or retract the crowd cylinders (parallelogram function).

A pressure sensor **B211** is installed on the bottom side of the shovel tilt cylinder, on **VB1**. In order to control the lowering speed, the spool valves are moved proportionally to the pressure read by the sensor **B211**. The out movements of the shovel tilt cylinders are also managed by a related system (refer to the section "Damping system" in this chapter).

The shovel tilt cylinder in and out movements are supplied by the working pumps **P1** and **P2** through the control valve block **VB1**.

Because of a primary pressure relief valve installed on each control valve block, the pressure coming from the working pumps cannot be more than 350 bar.

If the shovel movement is done simultaneously with others movements, the movement may not be supplied by these pumps.

The control valve block supply the oil flow equally between the shovel tilt cylinders **CBT1** and **CBT2**.

LEC / en / version: 11 / 2019

copyright © Liebherr-Mining Equipment Colmar SAS 2019

This control valve block contains, in a compact housing, the directional spool valves which are necessary for the travel and attachments movements of the machine. It also contains pressure relief valves for the different circuits:

- Height hydraulically operated spool valves which supply hydraulic flow from the main hydraulic pumps to the different cylinders or motors.
- Two primary pressure relief valves **PRV** (pilot operated) that control the pressure between the main pumps and the control valve block. These valves are installed on the upper housing, directly above the high pressure connection.
- Ten secondary pressure relief valves **SRV** which are located on the control valve block. These valves limit the secondary pressure to the adjusted maximum pressure.

9.1.4 Function

Spool valves in neutral position

In neutral position, the connections between user and pumps and user and tank are closed.

The hydraulic oil from pumps comes to the pressure port of the control valve block. Nearly without pressure, it flows threw the spools to connection **T**. Then the oil returns to the tank.

Working position of spool valves

If a spool valve is moved from its neutral position, the connection from pump to user is opened and restricts at the same time the flow to the tank.

The pump pressure rises until it reaches the pressure on the user connection. Oil starts to flow to the user. When the spool valve moves further, the connection from pump to tank closes off and opens the connection for the returning oil from the user to the tank.

The total oil flow from the pump is now available for the user.

The movement of the spool valve depends only on the available control pressure. This control pressure can be changed continuously depending on the movement of the appropriate joystick (see description and function in § "Electro-hydraulic pilot control system").

Due to a negative spool overlap, together with the metering notches, the oil flows to the users and thus all working and travel movements can be controlled by pistons in the control blocks.

Springs, which are installed on the upper end of the spool, return the spools to neutral position if control pressure is not available.

Internal leakage on a user connection under pressure are influenced by the overlap and the play between housing and piston.

LEC / en / version: 11 / 2019

copyright © Liebherr-Mining Equipment Colmar SAS 2019

9.4 Primary valve: pilot operated pressure limiting valve

9.4.1 Use

If the resistance, which acts against the load in a hydraulic system, were to rise to an undesirable and unacceptable level, the weakest point in the hydraulic system would be destroyed. To prevent this, an artificial weak point, a kind of circuit breaker (relief) is added. The object is locate this hydraulic component, which is initially held in a closed position by adjustable spring pressure, so the fluctuating system of the whole hydraulic pressure circuit can act on it. An increase in system pressure above the pressure setting of the relief valve lifts off the poppet, ball or piston and directs the excess pressurized fluid, supplied by the pump but not accepted by the end user, back to the tank. The hydraulic energy produced in this process is converted into heat.

This hydraulic component a pilot operated pressure-limiting valve (primary valve).

These cartridge types primary pressure relief valves in the control valve are located in front of the first piston. A direct acting relief valve is installed as a control part in the pilot operated pressure relief valve, which triggers an impulse to the second, larger valve. Both valves are normally open.

A characteristic of this valve is that once the valve has started to relieve and is contaminated; no further increase in pressure is possible. This protects the system and damage to the components is avoided.

9.4.2 Function

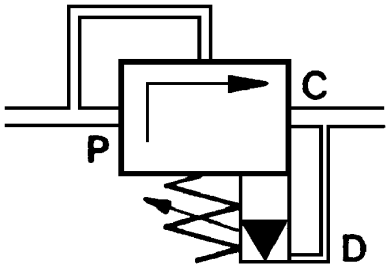
During operation, the system pressure pushes against the front side of piston **31**. The same pressure is simultaneously applied via orifice **A** on the backside of piston **31**, and via orifice **B** to poppet **33**. Springs **32** and **14** move piston **31** and poppet **33** into closed position.

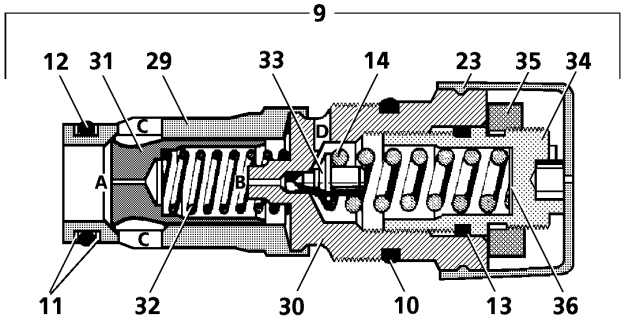
As soon as the system pressure exceeds the pressure setting of spring **14**, the poppet **33** is lifted off its seat, and some fluid escapes into the return line via orifice **D**. The previous static condition is now dynamic as fluid is trying to flow via orifice **A** in order to compensate for the loss of volume and pressure. The size of the orifice prevents immediate compensation, and a temporary difference in pressure between the top and bottom of the main piston **31** exists.

The difference in pressure causes the system pressure, which is still pushing against the front of piston **31**, to lift the piston from its seat and large amounts of fluid can return to the tank via connection **C**.

9.4.3 Pressure adjustment

To adjust pressure, remove cap **23**, loosen lock nut **35** and turn the adjustment screw **34** clock- or counterclockwise to lower or raise the pressure. After the adjustment has been made, secure screw with lock nut (torque to 10 Nm) and install a lead seal.





LEC / en / version: 11 / 2019

copyright © Liebherr-Mining Equipment Colmar SAS 2019

LEC / en / version: 11 / 2019

copyright © Liebherr-Mining Equipment Colmar SAS 2019

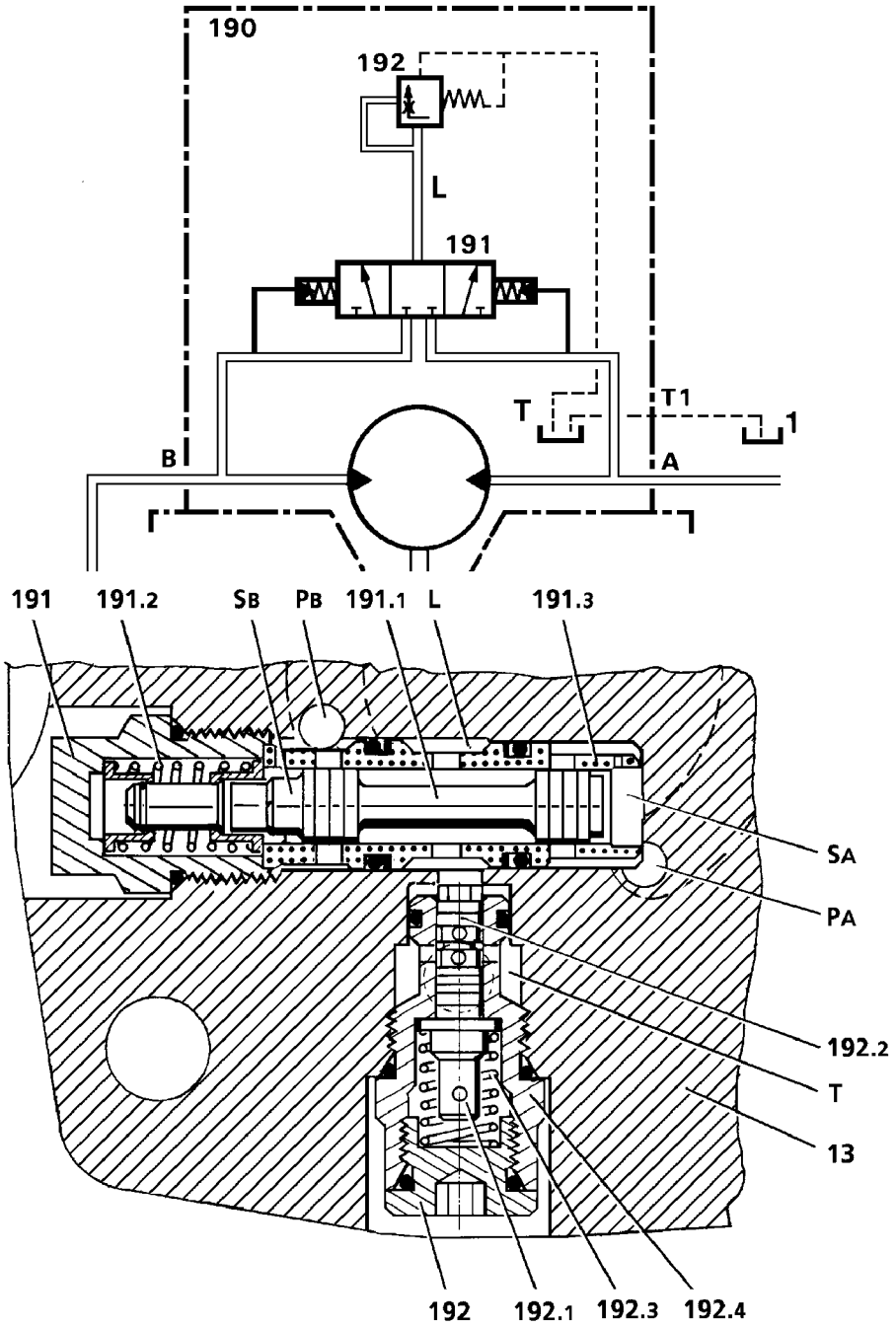


Fig. 8 *Section of discharge two ways check valve*

13	Connector plate - discharge two way check valve	**192**	Discharge pressure - flow regulator
191.1	Piston	**192.1**	Piston
191.2	Spring	**192.2**	Flow regulator
191.3	Bushing	**192.3**	Spring
		192.4	Bushing

6.2.4 Function of discharge valves in connector plate

The discharge valves **191** and **192** allows a small amount of oil from the low-pressure connection on the motor to escape into the motor housing.

copyright © Liebherr-Mining Equipment Colmar SAS 2018

6 Adjustment

▶ For adjustment instructions, refer to the section "Adjustment procedure R9100" in chapter 3 "Technical Data" of this manual.

LEC / en / version: 11 / 2018

copyright © Liebherr-Mining Equipment Colmar SAS 2018

2.13 Energies

	• Electricity
	• Temperature (hot or cold surfaces)
	• Position energy (raised components)
	• Parts subject to pressure (operating pressure, oil pressure, grease pressure, air pressure, etc.) • Bursting reservoir if filled by a high-performance pump
	• Parts subject to spring tension

2.14 Lubricants

- Greases
- Oils

Transport lifecycle	
Residual risks	**Remedy**
Tilting or falling of parts during transport, e.g. over inclines.	Secure parts against tilting or falling during transport (e.g. using tapes, belts, ropes, etc.).
Dropping of lifted parts or tools.	No people may remain under suspended loads. Keep unauthorized persons away. Secure suspended loads using suitable hoisting equipment (e.g. tapes, belts, ropes, etc.).

2.15 Existing residual risks

Installation life cycle	
Residual risks	**Remedy**
People slipping due to floor contamination with spilled or leaked lubricant	Take care when filling. Bind and remove leaked or spilled lubricant immediately with a suitable agent. Follow the operational instructions for handling lubricants and contaminated parts.

LEC / en / Edition: 09/2018

Copyright © Liebherr Mining Equipment Colmar SAS 2018

9.2.3 Single-line system

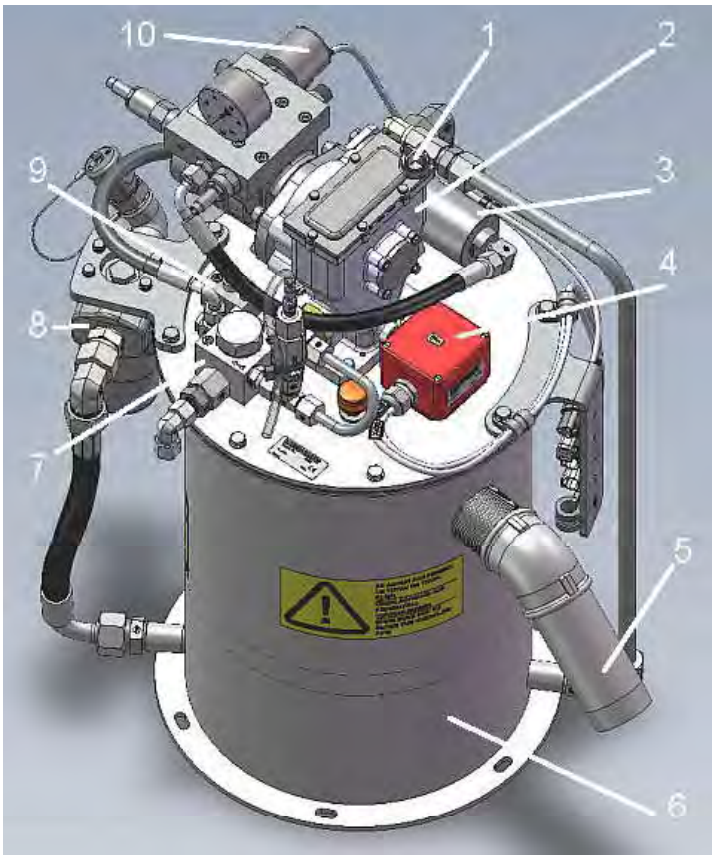
The single-line system consists of a pump to supply lubricant under pressure to the injector metering devices via the supply line. The injector metering devices deliver lubricant to a secondary (progressive) metering device or to the bearing through feed lines.

The lubrication cycle is initiated by an automated pump. The injectors have indicator stems, which move in and out to indicate that they have been cycled.

A controller will control the automated system.

The time between on cycles and the length of off cycles is adjustable. The controller includes the timer function above with a monitor function and alarm capability. A pressure switch is used to indicate when system pressure has been reached to turn off the pump and verify that a lube cycle has been completed. If the pressure switch does not detect full pressure within a preset period of time, the controller goes into alarm state.

9.2.4 Pump station 27L



1 Dip stick

2 Pump P1 – Model FlowMaster II

3 Hydaulic relief (vent) valve

4 Contact rod – B96 (low level control) + B185_1 (high-level control)

5 Overflow pipe

6 Grease reservoir 27L for FlowMaster II-pump

7 Strainer assembly, pressure line

8 Lubricant filter, refilling

9 Optical high-level control

10 Solenoid Y34_1 (pump control)

Fig. 10-6 Central lubrication pump 27L

For information and descriptions of the components, refer to chapter 13.

Copyright © Liebherr Mining Equipment Colmar SAS 2018

CLICK HERE TO DOWNLOAD THE COMPLETE MANUAL

- Thank you very much for reading the preview of the manual.
- You can download the complete manual from: www.heydownloads.com by clicking the link below



- Please note: If there is no response to CLICKING the link, please download this PDF first and then click on it.

CLICK HERE TO DOWNLOAD THE COMPLETE MANUAL

Introduction

Explanation of Symbols Used

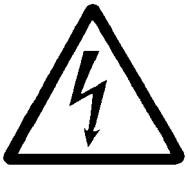
The following description standards are used in this manual:

Safety Instructions

Structure of safety instructions:

- Pictogram
- Signal word
- Danger text
  - Danger note
  - How to avoid danger

The following pictograms are used in this manual and are combined with the corresponding signal words:

 1013A94	 4273a00	 6001a02
- ATTENTION **- CAUTION** **- WARNING**	**- ATTENTION** **- CAUTION** **- WARNING**	**- NOTE** **- IMPORTANT**

The signal words give the seriousness of danger if the following text is not observed:

ATTENTION	refers to faults or damages on machines.
CAUTION	refers to bad damages and possible injuries.
WARNING	refers to possible dangerous injuries.
NOTE	indicates improved operation of the device.
IMPORTANT	indicates special operating features of the device.

Example:


1013A94

ATTENTION!

When making use of other than the tested spare parts, serious damage may affect your device.

Furthermore, you will find the following text symbols in this manual:

- Listing of applicable statements
  - Subpoint of applicable statements

1. Determination of the number or sequence of contents

➲ Procedural instruction

User's Responsibility

To ensure the safe operation of the unit, the user is responsible for the following:

1. The pump / system shall be operated only for the intended use (see next chapter "Safety Instructions") and its design shall neither be modified nor transformed.
2. The pump / system shall be operated only if it is in a proper functioning condition and if it is operated in accordance with the maintenance requirements.
3. The operating personnel must be familiar with this User Manual and the safety instructions mentioned within and observe these carefully.

The correct installation and connection of tubes and hoses, if not specified by SKF, is the user's responsibility.

Lincoln GmbH will gladly assist you with any questions pertaining to the installation.

Environmental Protection

Waste (e.g. used oil, detergents, lubricants) must be disposed of in accordance with relevant environmental regulations.

Service

The personnel responsible for the handling of the pump / system must be suitably qualified. If required, SKF offers you full service in the form of advice, on-site installation assistance, training, etc. We will be pleased to inform you about our possibilities to support you purposefully.

In the event of inquiries pertaining to maintenance, repairs and spare parts, we require model specific data to enable us to clearly identify the components of your pump / system. Therefore, always indicate the part, model and series number of your pump / system.

Subject to modifications

SKF Lubrication Systems Germany GmbH ● Heinrich Hertz-Str. 2-8 D-69190 Walldorf Tel. +49(0) 6227 33-0 ● Fax: +49 (0) 6227 33-259

Safety Instructions

Appropriate Use

Use SSVD and SSVD-E lubricant metering devices only for dispensing lubricants in centralized lubrication systems.

Suitable Lubricants

- The progressive metering devices can be used for dispensing
  - mineral oils of at least 40 mm²/s (cST) or
  - greases up to the penetration class NLGI 2


6001a02

IMPORTANT

It must nevertheless be ensured that the oils or greases used do not alter their consistency significantly in the course of time or under the influence of temperature or pressure.

General Safety Instructions

- The progressive centralized lubrication system connected to a pump must always be secured with a pressure relief valve.
- Lincoln SSVD and SSVD-E lubricant metering devices are state of the art.
- Incorrect use may result in bearing damage caused by poor or excessive lubrication.
- Each outlet needed must be provided with a check valve in order to be able to feed the lube points with the precise amount of lubricant and avoid poor lubrication.
- In the case of the metering devices model SSVD6 to 22 and SSVD6-E to 22-E outlets 1 and 2 must never be closed.
- Outlets 1 and 2 of the special metering devices model SSVD6/5 to 22/21 and SSVD6/5-E to 22/21-E are connected via a channel (marked by a double arrow). One of the two outlets must be closed. This means, the lubricant quantity of the closed outlet is lead to the opposite outlet (see Fig. 19).


1013A94

CAUTION

Damage due to poor lubrication!

If, however, both outlets are connected to a lube point the bypass metering device SSVD6/5 to 22/21 and SSVD6/5-E to 22/21-E cannot work to 100 %. The lubricant follows the way of the lowest resistance. It reaches the lube points of outlets 1 and 2 only insufficiently or not at all.

- Unauthorized modifications or changes to an installed system are not admissible. Any modification must be subject to prior consultation with the manufacturer of the lubrication system.
- Use only original spare parts (see Parts Catalog) or the parts approved by SKF.

Installation

- Install the metering devices at a suitable location in accordance with the lubrication diagram.
- It is recommended that the metering devices be installed in such a way that the outlets are not close to the chassis or the attaching plate. This will facilitate troubleshooting in the case the system is blocked.
- The main metering devices with indicator pin must be installed in such a way that the indicator pin is easily visible.

When the push-in type fittings are used, note the following:

- For the metering **device inlet** use only **push-in type fittings** (R 1/8) with **reinforced collar** and sealing ring.
- For the **outlet tube fittings** of the **SSV divider valve** (M 10x1) depending on the design of the lubricant line, for example
  - high-pressure plastic hose (Ø 4.1 x 2.3) use valve bodies with reinforced collar only, or,
  - pressure plastic tube (Ø 6 x 1.5) use valve bodies with knurled collar only
- For the **outlet fittings** of the **SSV M divider** divider valve (M 8x1) pressure plastic tube (Ø 4 x 1) use valve bodies with knurled collar only.


6001a02

NOTE

In the case of construction machines or agricultural machines use high pressure plastic hoses for the lubricant feet lines. In such cases the outlet fittings of the secondary metering devices and the connection fittings to the lubricant points must have a reinforced collet.

- Use only the main and feed lines specified by SKF and adhere to the specified system pressures.

Regulations for Prevention of Accidents

- To prevent accidents, observe all city, state and federal safety regulations of the country in which the product will be used.
- Avoid the operation with
  - unapproved parts.
  - insufficient or contaminated lubricants.


1013A94

CAUTION

Danger of injury in the case of serious corrosion of metering device surfaces: An increasing corrosion of the surfaces will cause the balls pressed in to lose their hold. Under pressure, they may suddenly burst out and cause injuries.
For applications in corrosive environments, use metering devices in stainless steel version only.

Operation, Repair and Maintenance

Authorized and instructed personnel who are familiar with the centralized lubrication systems should only perform repair.

SKF Lubrication Systems Germany GmbH ● Heinrich Hertz-Str. 2-8 D-69190 Walldorf Tel. +49(0) 6227 33-0 ● Fax: +49 (0) 6227 33-259

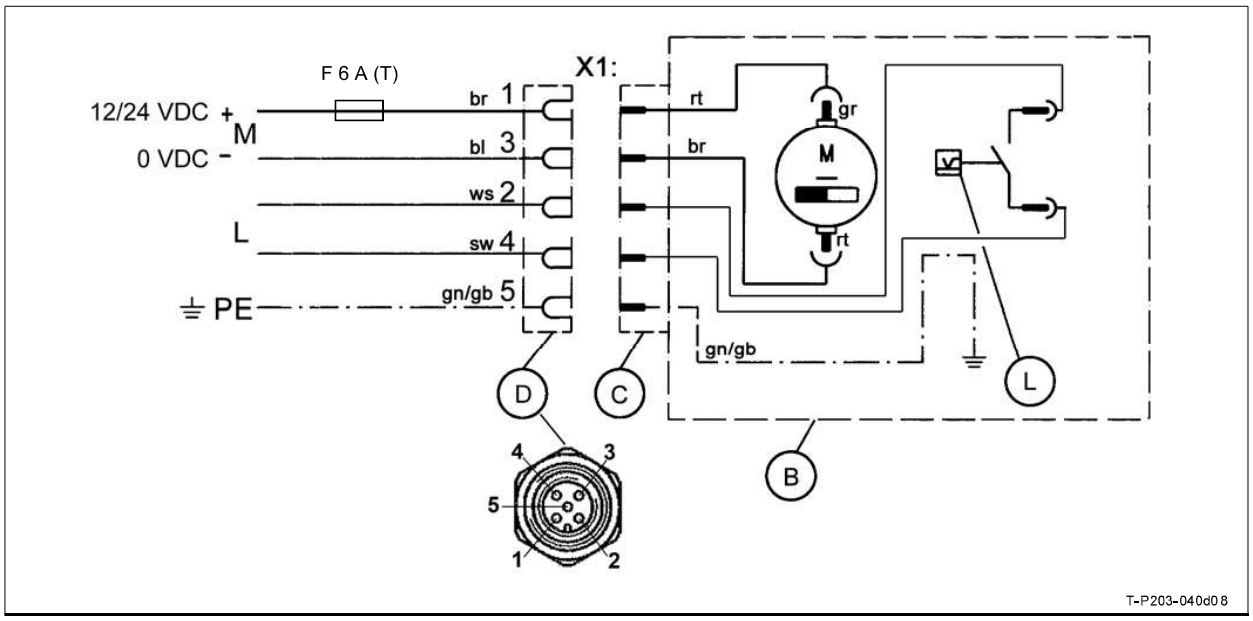
Manufacturer:
SKF Lubrication Systems Germany GmbH
Heinrich Hertz-Str. 2-8 D-69190 Walldorf
Tel. +49(0) 6227 33-0 Fax: +49 (0) 6227 33-259
E-Mail: Lubrication-germany@skf.com
© SKF All rights reserved

Subject to modifications

Technical Data, continuation

VDC connection diagram only for industrial application

- without integrated control unit
- with low-level control
- Supply voltage 12/24 VDC
- Type of connection **1A2** M12 plug, 5/5-pole (X1)



Connection diagram Quicklub P 203 VDC without integrated control unit

Connection X1: M12 plug, left 1A2
Socket, 5/5-pole for power supply 12/24 VDC and low-level control

B - Pump housing
C - Connection plug
D - Line socket 1 with connecting cable, 5 pole (1-5)
- alternatively: connecting cable from the user

M - Electric motor
L - Low-level control
Switching capacity max. 60 W/VA
Switching voltage max. 230 VAC
Switched current max. 1 A

rt - red
bl - blue
gr - grey
ws - white
br - brown
sw - black
gn/gb - green/yellow

Subject to modifications

SKF Lubrication Systems Germany GmbH ● Heinrich Hertz-Str. 2-8 D-69190 Walldorf Tel. +49(0) 6227 33-0 ● Fax: +49 (0) 6227 33-259

Technical Data

Rated voltage ..... 12/24V DC
Operating voltage 12V/ 24V ..... 9V to 30V

Residual rippple in relation
with the operating voltage ..... ± 5% acc. to DIN 41755

Motor output ..... transistor 7A/short-circuit proof
Reverse voltage protection:
The operating voltage inputs are protected against polarity reversal

Temperature range ..... -25°C to 70°C
Output fault / readiness for service:
..... transistor 3A/short-circuit proof

Class of protection:
Printed circuit board installed in housing.....IP 6K 9K

In order to protect the printed circuit board against condensation, it has been covered with a protective varnish.

All the printed circuit boards comply with the EMC (Electromagnetic compatibility) guidelines for road vehicles acc. to DIN 40839 T1, 3 and 4.

The printed circuit boards model **M** additionally comply with the EMC guideline 89 / 336 / EWG
Emitted interference acc. to.....EN 55011 / 03.91 and
.....EN 50081-1 / 01.92
Noise immunity acc. to ..... prEN 50082-2 / 1993

Time setting:
Pause time, acc.to jumper position:
..... 4, 8, 12,...to 60 minutes
.....1, 2, 3...to 15 hours
The operating time is switched off via the piston detector.

Factory setting
Pause time.....6 hours
or .....24 minutes
Monitoring time.....5 minutes
or .....30 minutes

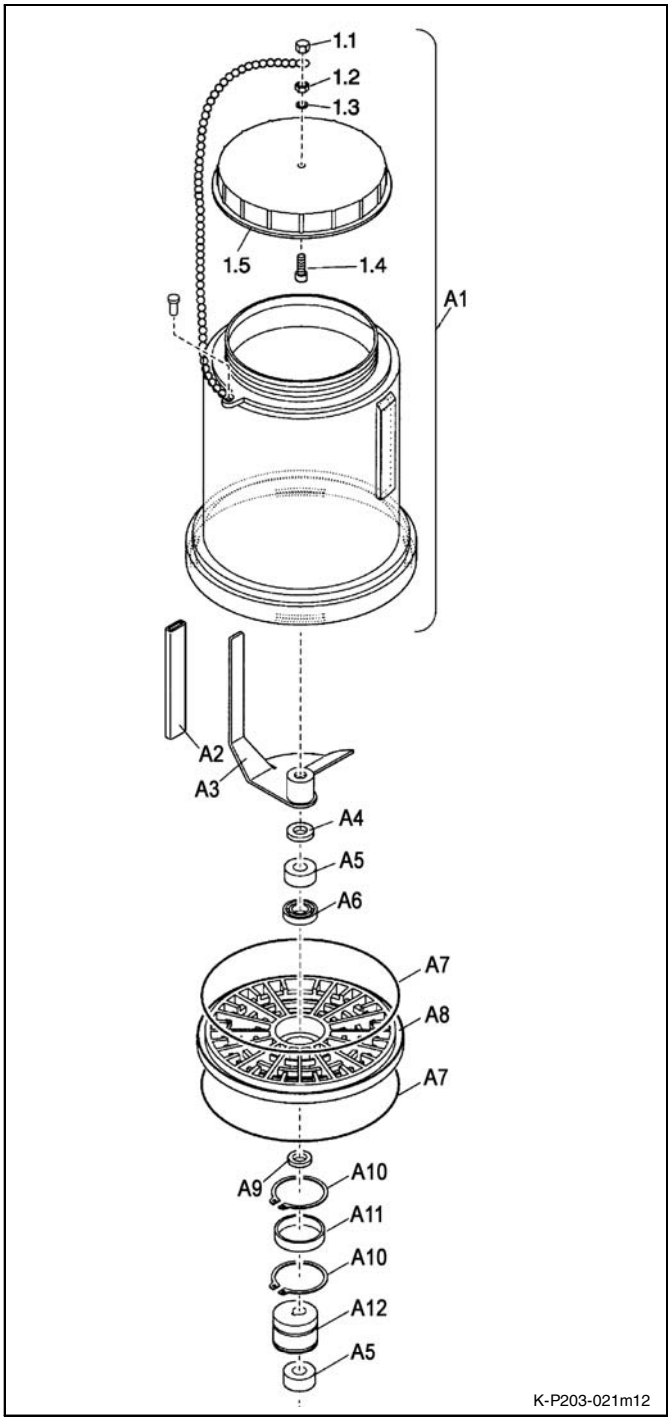
Subject to modifications

SKF Lubrication Systems Germany GmbH ● Heinrich Hertz-Str. 2-8 D-69190 Walldorf Tel. +49(0) 6227 33-0 ● Fax: +49 (0) 6227 33-259

A … with 2 l reservoir for grease or oil A

P203-2XYNBO & P223/233-2XNBO-… without low-level control

- 2 l reservoir with lid
- with stirring paddle
- Control: V10-13 [1], V20-23 [1], MF/MDF01 [2], MF/MDF02 [3]
- Type of connection: 1A1.01/10 [1], 2A1.01/10 [1], 1A5.14 [1], 1A7.16 [1], 2A5.14 [2], 2A6.15 [3]



Pos.	Designation	Qty.	Part no.
A	**Reservoir assembly**		
A1	2-Liter-Behälter [4]	1	544-31940-1
1.1	Acorn nut M4 C	1	207-12247-5
1.2	Nut M4 C	1	207-12135-2
1.3	Washer A 4.3 C	1	209-12146-2
1.4	Hexagonal head screw M4 x 16	1	201-12015-4
1.5	Lid	1	221-12488-5
A2	Hose 12.5 cm	1	111-35089-2
A3	Stirring paddle incl. Pos. A2	1	544-33569-1
A4	Washer 8.4	1	209-13072-6
A5	Inner ring	2	444-24168-1
A6	Grooved ball bearing D 10/26 x 8	1	250-14009-7
A7	O-ring Ø 142 x 4	2	219-13730-7
A8	Intermediate bottom	1	444-24167-1
A9	Shim 10 x 16 x 0.5	1	209-13047-5
A10	Snap ring SW 32	2	211-14100-1
A11	Pressure ring Ø 33 x 37 x 13	1	444-24439-1
A12	Eccentric	1	444-24170-2

[1] for P203
[2] for P223/233, PCB terminals 15 + 30 bridged
[3] for P223/233, PCB terminals 15 + 30 not bridged
[1] or 2 l reservoir out of P203-2XLBO part no. 544-32027-1

Subject to modifications

SKF Lubrication Systems Germany GmbH ● Heinrich Hertz-Str. 2-8 D-69190 Walldorf Tel. +49(0) 6227 33-0 ● Fax: +49 (0) 6227 33-259



The Power of Knowledge Engineering

Drawing on five areas of competence and application-specific expertise amassed over more than 100 years, SKF brings innovative solutions to OEMs and production facilities in every major industry worldwide. These five competence areas include bearings and units, seals, lubrication systems, mechatronics (combining mechanics and electronics into intelligent systems), and a wide range of services, from 3-D computer modelling to advanced condition monitoring and reliability and asset management systems. A global presence provides SKF customers uniform quality standards and worldwide product availability.

Important information on product usage

All products from SKF may be used only for their intended purpose as described in this brochure and in any instructions. If operating instructions are supplied with the products, they must be read and followed.

Not all lubricants are suitable for use in centralized lubrication systems. SKF does offer an inspection service to test customer supplied lubricant to determine if it can be used in a centralized system. SKF lubrication systems or their components are not approved for use with gases, liquefied gases, pressurized gases in solution and fluids with a vapor pressure exceeding normal atmospheric pressure (1 013 mbar) by more than 0,5 bar at their maximum permissible temperature.

Hazardous materials of any kind, especially the materials classified as hazardous by European Community Directive EC 67/548/EEC, Article 2, Par. 2, may only be used to fill SKF centralized lubrication systems and components and delivered and/or distributed with the same after consulting with and receiving written approval from SKF.

Status of information:
07/2014

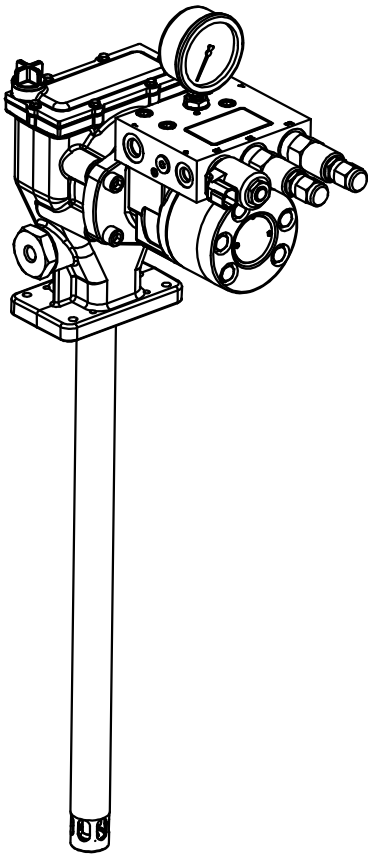
Manufacturer:
SKF Lubrication Systems Germany GmbH
Werk Walldorf
Heinrich Hertz-Str. 2-8
D-69190 Walldorf
Tel. +49(0) 6227 33-0
Fax: +49 (0) 6227 33-259
E-Mail: Lubrication-germany@skf.com

LINCOLN

Operation, assembly, disassembly and troubleshooting guide

FlowMaster II rotary driven hydraulic pump series “A”

85731, 5 U.S. gallon
85732, 60 lbs.
85733, 120 lbs.
85734, 400 lbs.



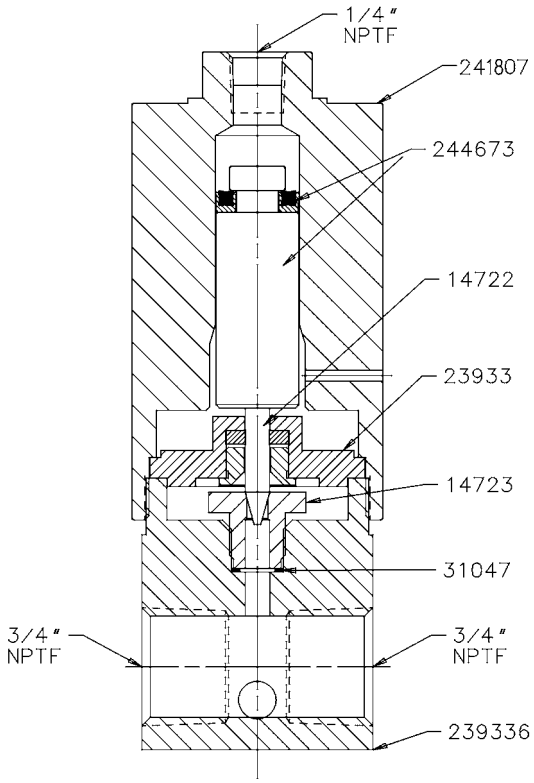
Date of issue	**October 2012**
Form number	**404432**
Section	**C8**
Page	**352A**

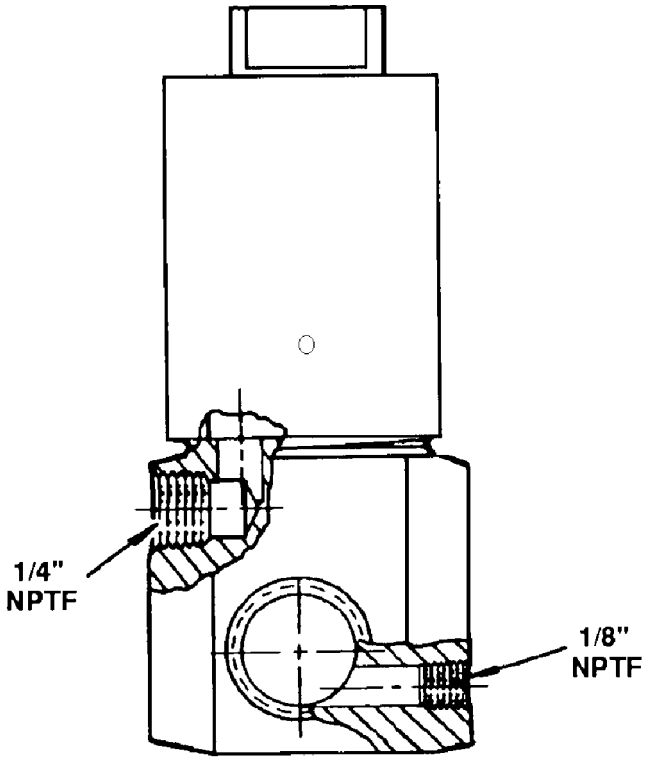
⚠ DANGER

Read manual prior to installation or use of this product. Keep manual nearby for future reference. Failure to follow instructions and safety precautions may result in death or serious injury.

SKF

MODEL 84980
HYDRAULIC VENT VALVE





SERVICE PARTS

Part	Qty.	Description	Part	Qty.	Description
14722	1	Needle	239330	1	Packing assembly
14723	1	Valve seat	239336	1	Valve body
31047	1	Check seat gasket	241807	1	Cylinder
			244673*	1	Piston & U-Cup Assy.

*Sold only as an assembly. Individual parts not available.

RETAIN THIS INFORMATION FOR FUTURE REFERENCE

When ordering replacement parts, list: Part Number, Description, Model Number, and Series Letter.
LINCOLN provides a Distributor Network that stocks equipment and replacement parts.

8 Utilisation

4 Seules les personnes autorisées sont habilitées à mettre en service et à utiliser l'interrupteur. Ne pas utiliser d'objets durs pour la saisie de données. Un autotest est exécuté lors de la première mise en service. La conduite est guidée par menus à l'aide de trois touches à membrane qui **ne doivent pas** être mises au contact d'objets durs ! Si une erreur est détectée au cours de l'autotest et du fonctionnement, elle est signalée par le clignotement d'une LED (jaune) ALARME (AL).
Cette erreur peut être appelée dans le menu Err. Les LEDs vertes S1 et S2 signalent l'activité des deux points de commutation.

9 Programmation

1		Après la mise sous tension M, passer au premier point de dialogue.
2	Passer à autre point de dialogue	A l'aide de ▼ ou ▲, sélectionner le point de dialogue souhaité (cf. chap. 10).
3	Activer le point de dialogue Entrée valeur/Sélect. fonction	A l'aide de M, sélectionner le point de dialogue souhaité, pour ensuite modifier la valeur correspondante ou la fonction souhaitée.
4	Modifier la valeur	A l'aide de M sélectionner les différents chiffres. A l'aide ▼ modifier la ▲ valeur numérique et confirmer à l'aide de M. Si la valeur entrée se situe á l'intérieur de la plage admissible, on passe au point de dialogue après saisie du dernier chiffre, sinon le premier chiffre clignote á nouveau.
5	Modifier la fonction	A l 'aide ▼ modifier la fonction ▲ et confirmer á l'aide de M.
	Activer le verrouillage du clavier	▲ + ▼ appuyer simultanément pendant au moins 5 s. L'affichage ne doit pas passer alors à un autre état. Si activé, apparaissent successivement Lo0 et par ex. u3.1*.
	Verrouillage du clavier activé	Les valeurs ou fonctions sont certes affichées, mais ne peuvent être modifiées. LOH apparaît à tout essai de modification.
	Désactiver le verrouillage du clavier	▲ + ▼ appuyer simultanément pendant au moins 5 s. L'affichage ne doit pas passer alors à un autre état. Si désactivé, apparaissent successivement Lo2 et par ex. u3.1*.
	Retour à la fonction de mesure	En l'absence de saisie pendant 2 min, l'interrupteur revient automatiquement en mode de mesure **sans** prise en compte des valeurs saisies.
	Terminer la programmation	M appuyer pendant au moins 5 s pour passer en mode de mesure.

* Version logiciel n°

10 Dialogue niveau utilisateur UDS8

Pt. de dialogue	Valeur	Fonction/Description
Act	0...4000	Affichage de la valeur de mesure actuelle
S1		Sélection de l'unité d'affichage nbr = mbar PSH = psi x 10 hPo = hPa bar = bar PSI = psi nPo = mPa
Und		Activation de l'affichage des unités on = Affichage des unités (toutes les 30 s) sur l'afficheur mis en service oFF = pas d'affichage sur l'afficheur
SP1		u in = Technique de fenêtres Err = sortie d'erreurs Std = Evaluation standard
on1*	0 ... xxxx	Point de mise en service pour SP1; si le réglage de la valeur ON est inférieur à celui de la valeur OFF, on obtient une évaluation des points de contact descendante.
OF1*	0 ... xxxx	Point de mise hors service pour SP1
dS1	0,0 s ... 9,9 s	Temporisation de mise en service pour SP1 en secondes
dr1	0,0 s ... 9,9 s	Temporisation de mise hors service pour SP1 en secondes
iu1		Inversion de la sortie de commutation SP1 HFS = High-level-fail-save (fonction fermeture) LFS = Low-level-fail-save (fonction ouverture)
SP2		u in = Technique de fenêtres / Err = Sortie d'erreurs Std = évaluation standard
on2*	0 ... xxxx	Point de mise en service pour SP2; si le réglage de la valeur ON est inférieur à celui de la valeur OFF, on obtient une évaluation des points de contact descendante.
OF2*	0 ... xxxx	Point de mise hors service pour SP2
dS2	0,0 s ... 9,9 s	Temporisation de mise en service pour SP2 en secondes
dr2	0,0 s ... 9,9 s	Temporisation de mise hors service pour SP2 en secondes
iu2		Inversion de la sortie de commutation SP2 HFS = High-level-fail-save (fonction fermeture) LFS = Low-level-fail-save (fonction ouverture)

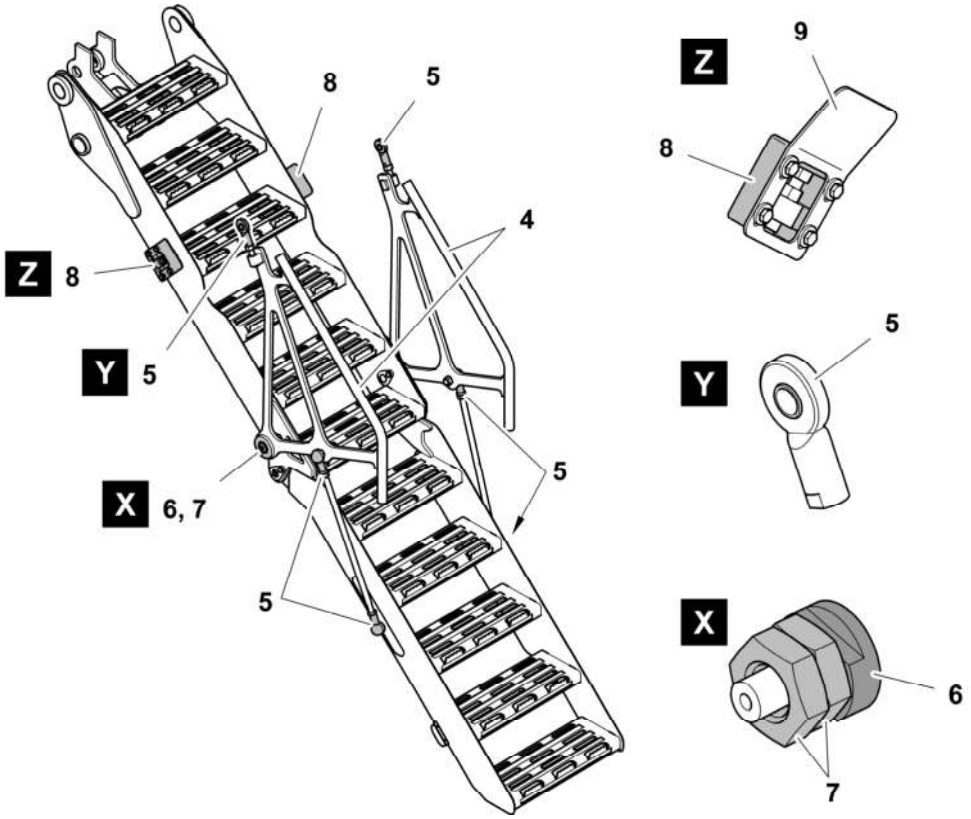


Fig. 15 *Installation of the access ladder components*

4 Handrail (2x)
5 Pivot (6x)
6 Handrail nut (2x)
7 Handrail locknut (4x)
8 Upper ladder stop (2x)
9 Upper guide plate (2x)

▶ Make sure that all the components **4** to **9** are installed on the access ladder.

LEC / en / version: 02 / 2020

copyright © Liebherr-Mining Equipment Colmar SAS 2020

F236	Fuse 15 A / Supply greasing	**X815**	Connector 2 poles / **R42**
F237	Fuse 7,5 A	**X828**	Connector 2 poles / **S100_2**
F238	Fuse 7,5 A / Supply KT56		

LEC / en / version: 08 / 2019

copyright © Liebherr-Mining Equipment Colmar SAS 2019

4.2.3 Valve bank

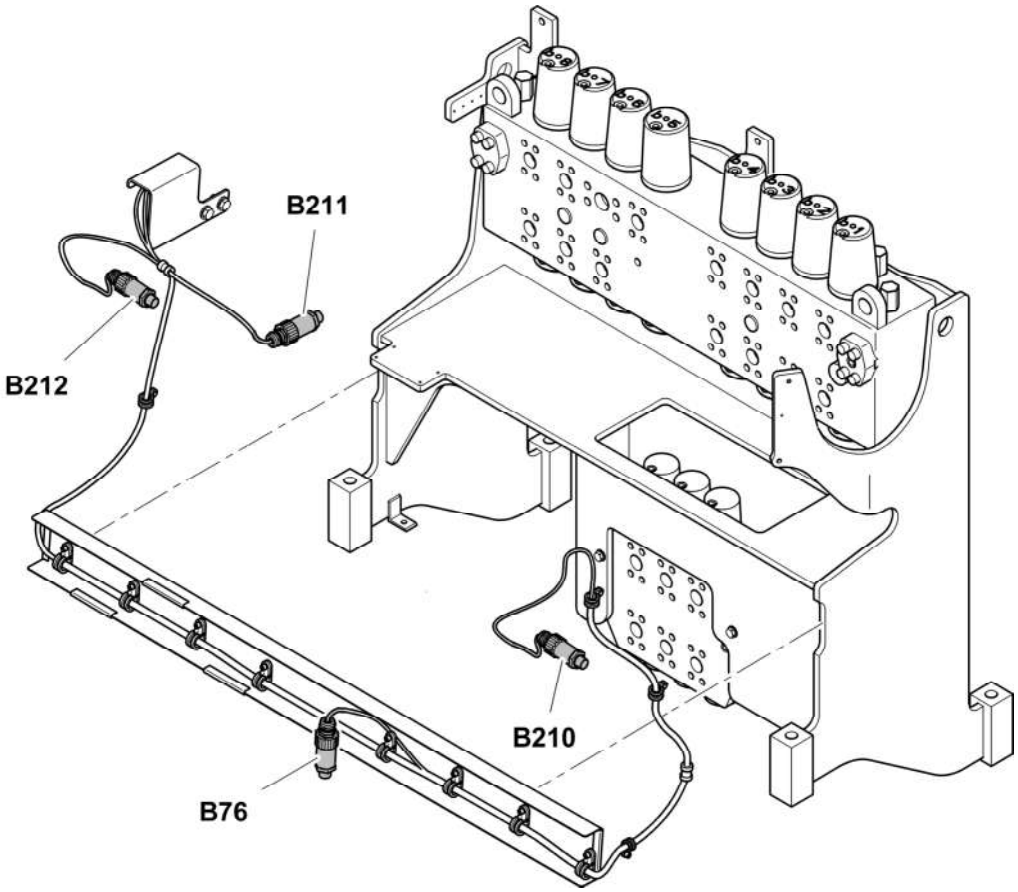


Fig. 30 *Configuration of valve bank sensors*

B76	Pressure sensor / Boom down with pressure	**B211**	Pressure sensor / Bucket/Shovel tilt cylinder
B210	Pressure sensor / Pressure boom up	**B212**	Pressure sensor / Stick/Crowd tilt cylinder

LEC / en / version: 08 / 2019

copyright © Liebherr-Mining Equipment Colmar SAS 2019

15.00: Uppercarriage - Mechanical

1 Coupling

1.1 Function and operation

1.1.1 Components location

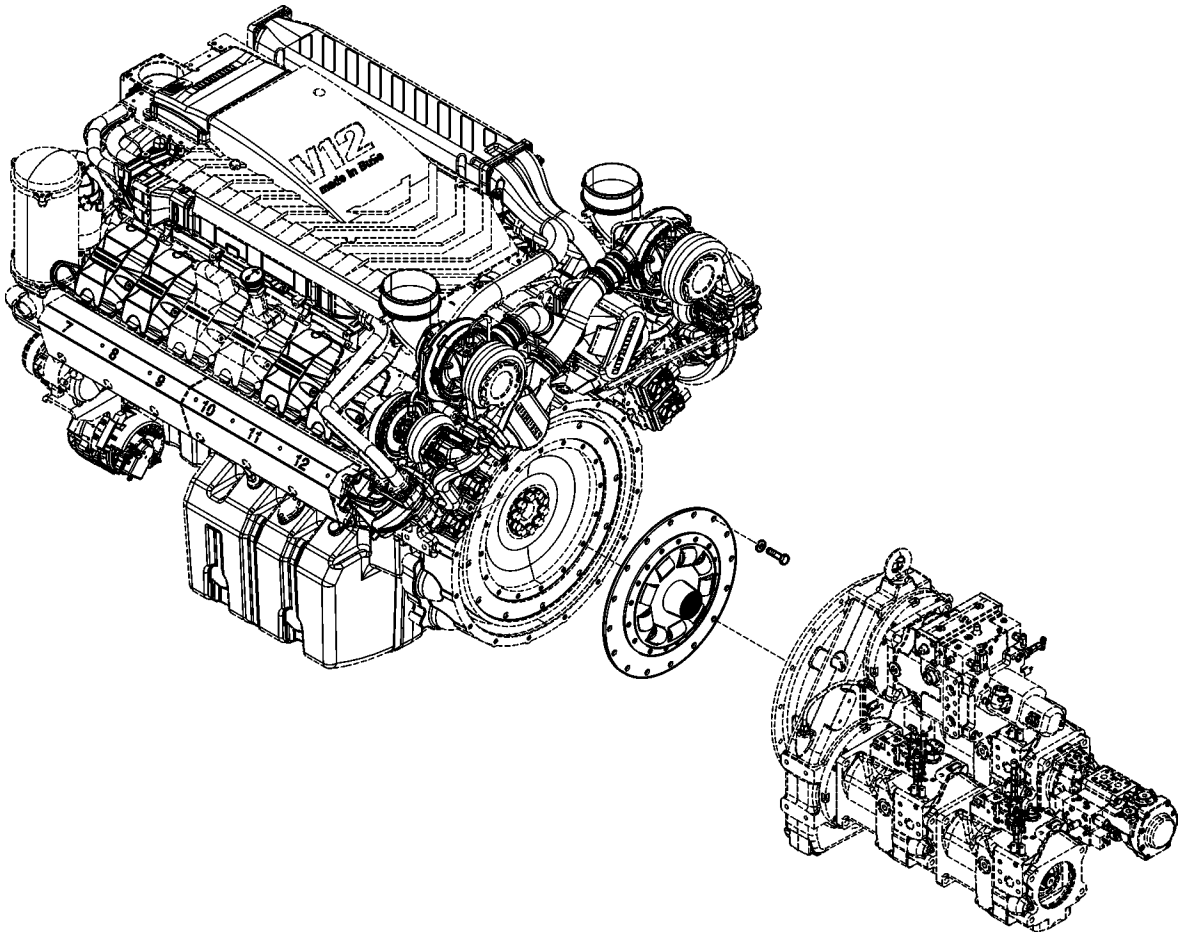


Fig. 1 *Location of the coupling*

1.1.2 Use

The elastic coupling (torsional vibration damper), which is installed between the Diesel engine and the splitterbox, compensates for shaft (crankshaft - pump input shaft) misalignments, which could be caused by manufacturing and dimensional variations. The elastic coupling also absorbs the residual torsional vibration of the Diesel engine as well as the torque jolts caused by load fluctuations.

It transfers engine torque to the splitterbox directly and constantly, which means that it cannot be disengaged.

1.2 Install and remove the coupling

Caution!
Diesel engine and splitterbox must not be separated during installation or removal.

copyright © Liebherr-Mining Equipment Colmar SAS 2019

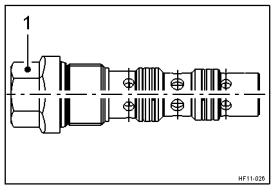
copyright by

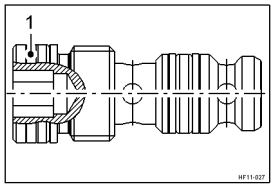
5.3.7 Expansion and conversion with other pieces of equipment

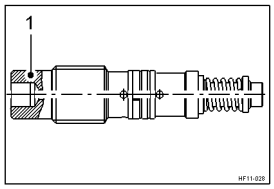
- Pieces of equipment and attachment parts of other manufacturers, or parts that have not been generally approved by LMB for installation or attachment, may not be attached or installed on the hydraulic product without prior written consent from LMB.
- The necessary technical documents are to be made available to LMB for this.
- Before each important repair or installation of other pieces of equipment, place the hydraulic product on a level and stable surface, or set it up on the respective assembly stand. See repair manual
- Do not work underneath the hydraulic product while it is not securely standing on the workbench / ground or is set up on the assembly stand.
- Before unscrewing a line or screw fitting, the pressure in the hydraulic system must be relieved.
- Do not attempt to lift heavy parts. Use suitable aids with sufficient load capacity for this.
- Do not use damaged ropes or ropes that do not have a sufficient load capacity. Wear work gloves when handling wire ropes.
- Never straighten the holes with your fingers, but use a suitable mandrel for this.
- During the repair work: Make sure that the hydraulic lines are properly attached and that all screw fittings and connections are correctly tightened.
- As soon as a piece of equipment is dismantled and wedged, close the open points of the hydraulic circuit in order to prevent the infiltration of dirt.
- Allow only authorised persons in the proximity of the hydraulic product or the lifting device used.

copyright by

8.5.3 Shuttle valve torque

Item	Type	Torque Nm	
1 (complete valve)	**WV 10**	100	
-	**-**	-	
-	**-**	-	

Item	Type	Torque Nm	
1 (complete valve)	**WV 5**	15	
1 (complete valve)	**WV 7**	35	
1 (complete valve)	**WV 10**	40	
1 (complete valve)	**Stop plug**	15	

Item	Type	Torque Nm	
1 (complete valve)	**WV 5**	15	
-	**-**	-	
-	**-**	-	

copyright by
LIEBHERR

4 Swing bearing

4.1 Component location

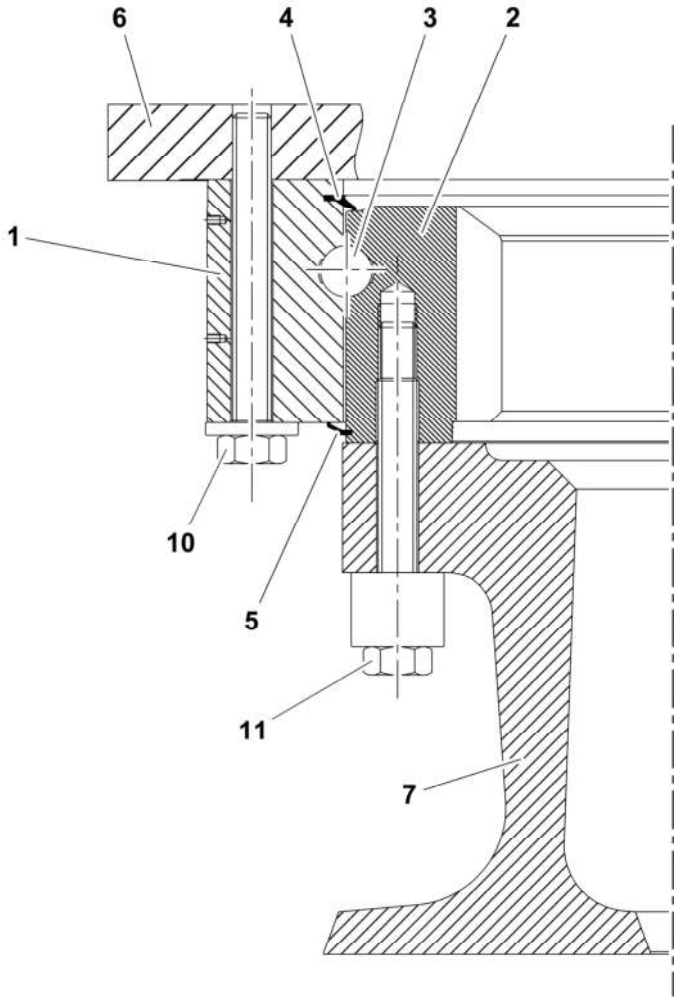


Fig. 9 *Swing ring installation*

1	Outer ring	**6**	Uppercarriage
2	Inner ring	**7**	Undercarriage
3	Roller	**10**	Hexagonal head screw M24x160 to uppercarriage x quantity 76
4	Upper seal	**11**	Hexagonal head screw M24x160 to undercarriage x quantity 90
5	Lower seal		

▶ For the tightening torques and control intervals, refer to the Operating Manual.

4.2 Technical data

	Units	Value
Type		KUD 464 VJ
Number of teeth		149

copyright © Liebherr-Mining Equipment Colmar SAS 2019

The bearing ring **5** bolted with the output housing **10** by the mounting bolts **11** drives the sprocket wheel and the chain. The RPM of the sprocket is the RPM of the hydraulic motor reduced by the complete ratio of transmission of the travel gear.
In contrast to that, the torque is raised. The torque generated at the bearing ring **5** is many times as high as the input torque existing at the hydraulic motor. The ratio of transmission is the complete transmission of the travel gear.

The rotating bearing ring **5** is seated on the stationary connection housing **1** by means of two rows of bearing rollers **3**, which are installed diagonally.

The axial face seal **58** is fixed between the connection housing **1** and the bearing ring **5**. Thanks to this seal the travel gear is sealed up from the exterior.

When there is no pressure in the hydraulic port for brake control pressure **89** the brake discs **86** are pressed together in the multi disc brake **70**.
The braking torque between the connection housing **1** and the plate carrier **65**, resulting from this pressure, is at least as high as the driving torque of the hydraulic motor and it is sufficient to ensure the blocking of the travel gear, even when the excavator is situated at a slope.

1.3 Installation / removal

1.3.1 Installation and removal of the inner travelling mechanism

For first installation or reparation, which necessitates the opening of travel gear, see the manufacturer documentation.

1.3.2 Installation and removal of the travel gear on the excavator

Component location

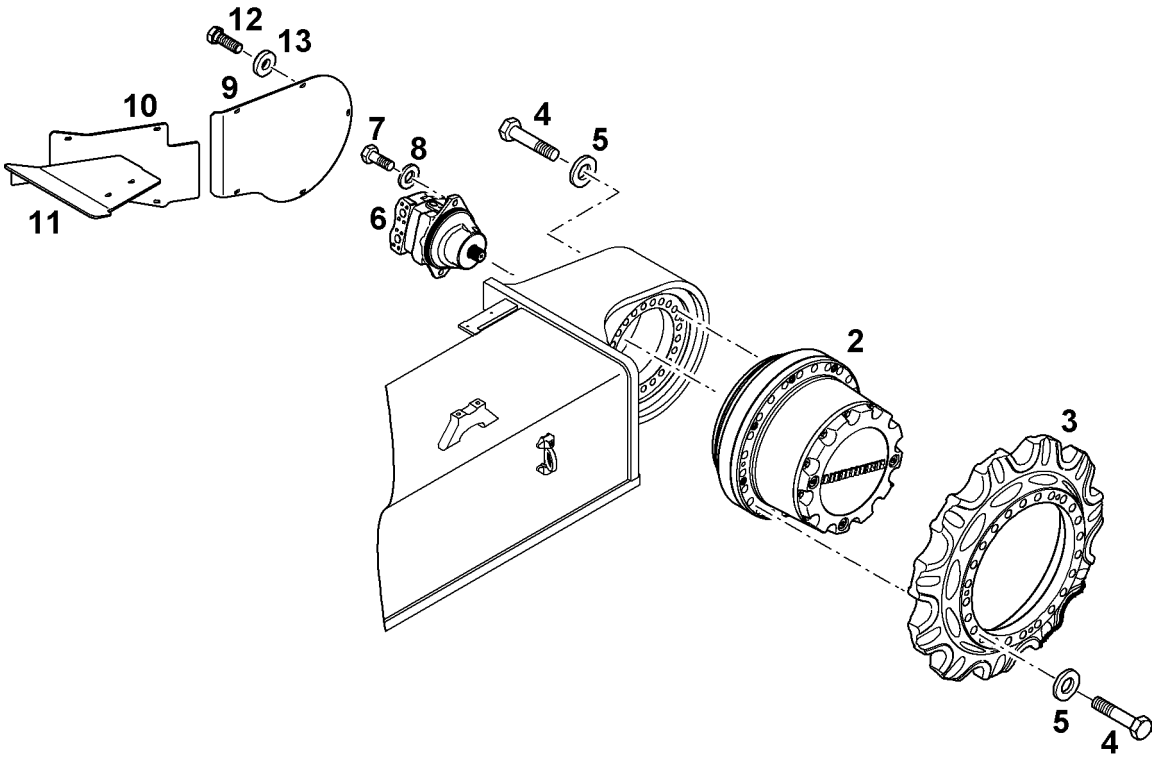


Fig. 6 *Travel gear components*

LEC / en / version: 11 / 2019

copyright © Liebherr-Mining Equipment Colmar SAS 2019

2.9 Install / remove the track components

Danger!
Falling parts!
Risk of death or serious injury.

- ▶ Only use applicable lifting devices, which are sufficiently dimensioned or which have been specially designed by Liebherr for this function. Only use an applicable crane.
- ▶ Before removal, make sure that the parts to remove are correctly attached with applicable devices.
- ▶ Make sure that no not approved persons are in the danger zone.

- ▶ To increase and decrease the track tension, refer to the Operating Manual.

2.9.1 Install / remove track pads and track chains

To prevent damages, you must examine the track pads at regular intervals.

- ▶ Do a check of the track pads conditions.
- ▶ Make sure that the pads wear does not get the maximal limit.
- ▶ Replace the damaged pads or the pads which have get the maximal wear limit.
- ▶ Refer to the Safe Work Procedures n° 0.04 and 3.02 in the chapter 2 of this Service Manual.

Replace damaged track pads

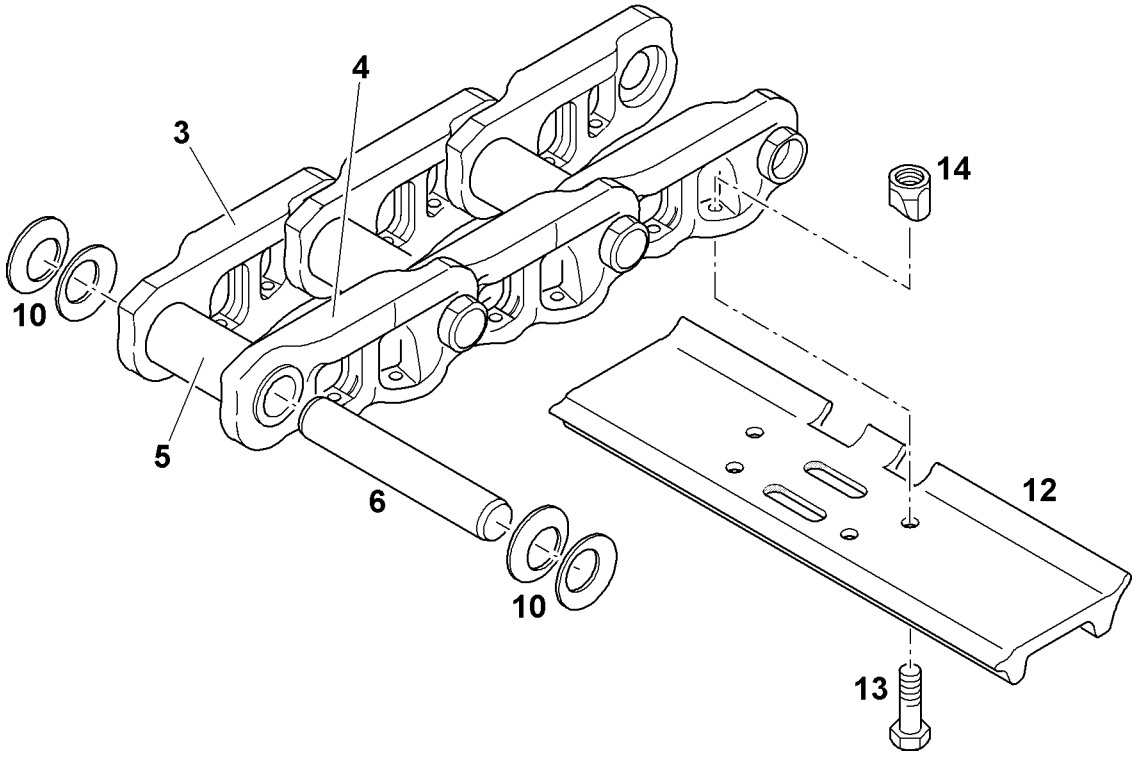


Fig. 27 *Track pad*

3	Left track link	**10**	Elastic washer
4	Right track link	**12**	Track pad
5	Track bushing	**13**	Locking screw
6	Track pin	**14**	Nut

LEC / en / version: 11 / 2019

copyright © Liebherr-Mining Equipment Colmar SAS 2019

- ▶ Lift the stick (crowd) **1** with a crane.
- ▶ Align the stick (crowd) **1** bushings with the boom **4** bushings (axis **a**).
- ▶ Install the pins **5** with related plates and screws.
- ▶ Extend the rod of the stick (crowd) cylinder **2** until the rod bushing is aligned with the related bushing of the stick (crowd) **1** (axis **b**).
- ▶ Install the pins **6** with related plates and screws.
- ▶ Stop the engine.
- ▶ Turn the ignition key to contact position.
- ▶ Push the safety lever down.
- ▶ Move the joysticks in all directions to remove the stored energy from the hydraulic cylinders and from the servo accumulator.
- ▶ Depressurize the hydraulic tank. Refer to the Operating Manual.
- ▶ Isolate the machine by disconnecting the principal batteries switches **S9_1** and **S9_2**. Refer to the related Safe Work Procedure.
- ▶ Make sure that all grease lines between boom **4** and stick (crowd) **1** are filled with grease. Install and plug it.
- ▶ Install all electrical wiring.
- ▶ Install and plug hydraulic lines between boom **4** and stick (crowd) **1**.
- ▶ Connect the electrical system of the machine back.

1.2.5 Remove the stick (crowd)

- ▶ Make sure that the bucket is removed.
- ▶ Make sure that the machine is on level and hard ground.
- ▶ Make sure that the excavator is not in a blast area.
- ▶ Use the applicable tools (refer to chapter 5 of this Service Manual) and jacking equipment. Also refer to the related tool instruction manuals.
- ▶ Make sure that the attachment is in a rested position.
- ▶ Lay down the boom **4** on the ground with the stick (crowd) **1** extended.
- ▶ Stop the engine.
- ▶ Turn the ignition key to contact position.
- ▶ Push the safety lever down.
- ▶ Move the joysticks in all directions to remove the stored energy from the hydraulic cylinders and from the servo accumulator.
- ▶ Depressurize the hydraulic tank. Refer to the Operating Manual.
- ▶ Isolate the machine by disconnecting the principal batteries switches **S9_1** and **S9_2**. Refer to the related Safe Work Procedure.
- ▶ Unplug and remove all grease lines between boom **4** and stick (crowd) **1**.
- ▶ Remove all electrical wiring.
- ▶ Unplug and remove hydraulic lines between boom **4** and stick (crowd) **1**.
- ▶ Remove the pins **6** of the connection between the rod bushings and the related bushings of the stick (crowd) **1** (axis **b**).
- ▶ Connect the electrical system of the machine back.

LEC / en / version: 04 / 2015

copyright by
LIEBHERR

2. Verschleißkappen (Mittel- und Seitenverschleißkappen)

2.1 Voraussetzungen

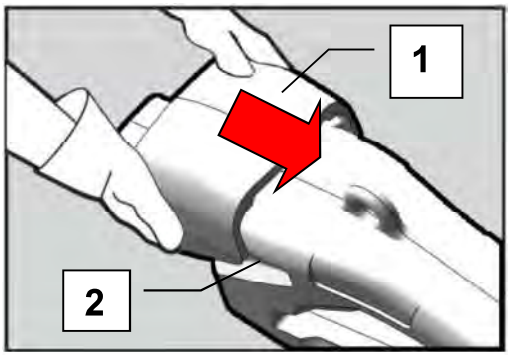
Für die Montage und Demontage der Kappe wird ein Ausziehwerkzeug benötigt. Es sollte geeignete Schutzkleidung getragen werden: Helm, Sicherheitsschuhe, Handschuhe und Schutzbrille.

Zur leichteren Montage und Demontage einer Kappe sollte der Tieflöffel so eingestellt werden, dass die Zähne nach oben zeigen.

Adapter, Halterung und Adapterführungen reinigen, um die erneute Montage zu erleichtern.

2.2 Montage

Die Kappe (1) in die Führungsschienen des Adapters (2) einsetzen.



Den Zahn wie im Kapitel 1.2 an den Adapter anbringen.
Mit dem Zahn wird die Kappe befestigt.

2. Wear cap (Central & Corner)

2.1 Prerequisites

For the assembly and disassembly of a wear cap an extraction tool is required. The use of protective clothing is recommended: helmet, safety shoes, gloves, and goggles.

In order to facilitate assembly and disassembly of wear cap, it is recommended to place the bucket so that teeth are facing slightly upwards.

Clean the whole tooth adapter nose, retainer housing and adapter guides to allow the subsequent assembly of the wear cap.

2.2 Assembly

Assemble the wear cap (1) through the adapter guides (2).

Assemble the tooth on the nose of the adapter following the chapter 1.2.
Tooth will block the wear cap to get out.

2. Chapeaux de protection (central et de coin)

2.1 Prérequis

Pour le montage et le démontage d'un chapeau de protection, un outil d'extraction est nécessaire. L'utilisation de vêtement de protection est recommandée : casque, chaussures de sécurité, gants et lunettes.

Afin de faciliter le montage et le démontage des chapeaux de protection, il est recommandé de placer le godet de manière à ce que les dents soient dirigées vers le haut.

Nettoyer l'adapteur, le logement de retenue, et les guides de l'adapteur afin de faciliter le nouveau montage.

2.2 Montage

Mettre en place le chapeau de protection (1) dans les glissières de l'adapteur (2).

**Bei Bedarf ein Hubgerät verwenden, ein Ring ist hierfür vorgesehen /
Use a crane to lift the wear cap if it is necessary. A lifting eye is provided /
Utiliser un moyen de lavage si nécessaire, un anneau est fourni**

Mettre en place la dent sur l'adapteur comme décrit dans le chapitre 1.2.
La dent permet de bloquer le chapeau de protection.

No copying or duplication of this document without the permission of Liebherr.
This document has been issued electronically and is valid without signature.

4.2 Function and operation of the unit

4.2.1 Function of the unit

- It dehydrates the air.
- It creates a pleasant room temperature.
- It provides sufficient fresh air (units equipped with fresh air facility).

4.2.2 Operation of the unit

- Air conditioner is only ready for work if vehicle engine is running.
- Heater and air conditioner are switched to on and adjust with the related module of air-conditioning (refer to section above).
- If the adjusted temperature is achieved, the compressor switches to off and the condenser fans stop function.

LEC / en / version: 12 / 2016

copyright © Liebherr-Mining Equipment Colmar SAS 2016

19. Function of Drying Process

Water evaporates at normal ambient pressure (1.013 millibar) and at a temperature of 100°C. If pressure is reduced, water evaporates at lower temperatures, e.g. at 10 millibar water boils at nearly 7°C temperature. The whole quantity of water evaporates gradually. It is also difficult to get vapor out of the unit's vacuum, therefore; the evacuating process is supported by the so-called vacuum break (filling of the circuit with dried nitrogen). While operating with vacuum break the filled-in, dried nitrogen absorbs the humidity out of the refrigerant circuit which can then be exhausted along with the nitrogen.

Boiling temperature (°C)	**Absolute pressure (millibar)**
100.0	1013.000
96.1	703.947
90.0	691.482
80.0	467.226
70.0	307.474
60.0	196.516
50.0	121.653
40.0	72.524
30.0	41.776
26.7	33.421
24.4	30.079
22.2	26.737
20.6	23.395
17.8	20.053
15.0	16.711
11.7	13.368
7.2	10.026
0.0	6.016
-6.1	3.342
-14.4	1.671
-31.1	0.334
-37.2	0.167
-51.1	0.033
-56.7	0.017
-67.8	0.003

Notes

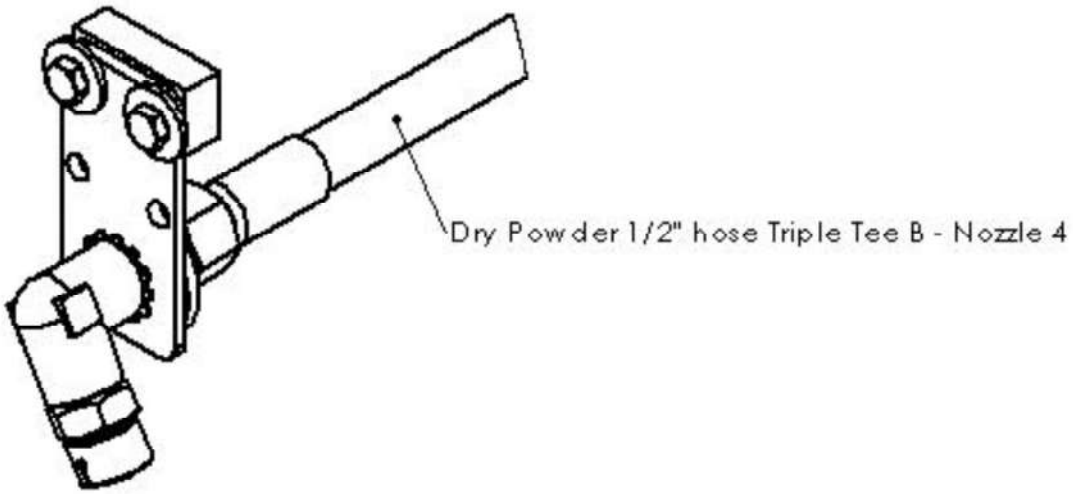
19.00: Fire suppression system

LEC / en / version: 02 / 2020

copyright © Liebherr-Mining Equipment Colmar SAS 2020

Nozzles N4 - covering rear engine top

The bracket is bolted to the nozzle bracket weld block.





Ardent
Vehicle fire protection

Fire Suppression System

INSTALLATION REPORT

Manufacturer Liebherr
Model R9100 (Tier II)
Kit No. KLIE0071
Specification A-3-50-16-1-LVS15-10-2M-210-ES

Version V1.0

IR-LIE-R9100-T2

PNEUMATIC/LINEAR DETECTOR INSTALLATION

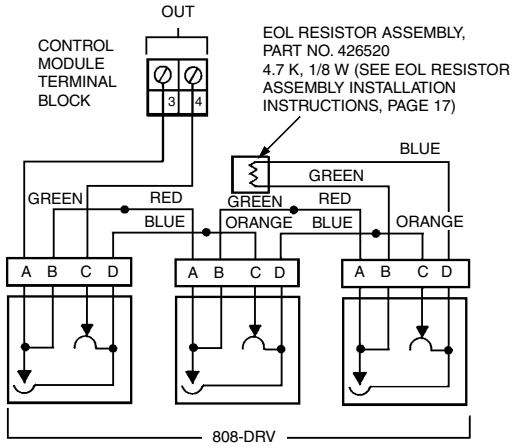
The pneumatic/linear fire detection system, Part No. 416113, is a Systron Donner Model 808-DRV. This detection system is completely compatible with the ANSUL CHECKFIRE SC-N control module.

Each detection system is shipped with a detailed Installation, Maintenance Manual.

When installation the pneumatic/linear detection system to an ANSUL CHECKFIRE SC-N control module, use connector/cable assembly, Part No. 416216, and install per Figure 39.

Note: Attach end-of-line resistor assembly by following the detailed steps listed on the instruction sheet included with the end-of-line resistor shipping assembly.

MULTIPLE DETECTORS



SINGLE DETECTOR

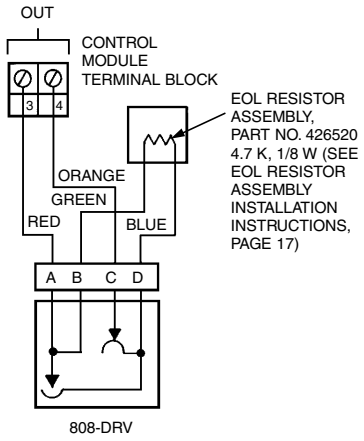


FIGURE 39
001059

AUTOMATIC ACTUATION LEAD CONNECTION

A 20 in. (51.0 cm) cable assembly for connecting the actuator to the control module is supplied with the CHECKFIRE SC-N Shipping Assembly, Part No. 436302. An optional longer cable is available for both versions.

Squib Connector Cable Assembly, Part No. 79062, used with Manual/Automatic Actuator, Part No. 24479, is pre-cut to 20 in. (51.0 cm) to reach between the actuator assembly and the control module on a standard bracket. An optional Connector Assembly, Part No. 422747, is 15 ft (4.6 m) long and it can be cut to any length required to make the connection between the control module and the Manual/Automatic Actuator.

The PAD connector/cable assembly, Part No. 436114, used with Manual/Automatic Actuator, Part No. 435479, is pre-cut to 20 in. (51.0 cm) to reach between the actuator assembly and the control module on a standard bracket. An Optional Connector Assembly, Part No. 436242, is 20 ft (6.1 m) long and it can be cut to any length required to make the connection between the control module and the Manual/Automatic Actuator.

⚠ CAUTION

Do not attach actuation cable to actuator at this time. If Manual/Automatic Actuator is connected, the system could be actuated accidentally during installation.

1. Route the cable from the actuator, through the strain relief, to the terminal strip at the control module. See Figure 40.
2. Leaving a little slack, cut off excess cable.
3. Strip the internal wires approximately 1/4 in. (0.6 cm) and securely fasten the red/green leads to Terminal 7 and the black/white leads to Terminal 8 on the control module. See Figure 40.

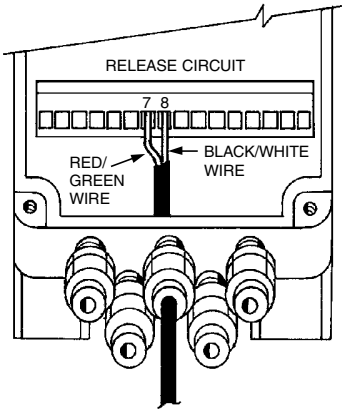


FIGURE 40
002767

4. Attach the release circuit tester, Part No. 423541, at this time. This will be required when performing the functional test, starting at Page 22.

ANSUL INCORPORATED
ONE STANTON STREET
MARINETTE, WI 54143-2542

Copyright © 2008 Ansul Incorporated

Part No. 423522-05

DETECTION CIRCUIT TESTER
Part No. 440097

Simulates normal, fault, and alarm conditions for testing the CHECKFIRE 210 System performance. See Figure 2-42.

Switch settings:

Normal

Fault

Alarm



FIGURE 2-42
DETECTION CIRCUIT TESTER
009287

RELEASE CIRCUIT TESTER
Part No. 441021

Indicates a successful release energy pulse to fire the PAD (pass or fail). See Figure 2-43.



FIGURE 2-43
RELEASE CIRCUIT TESTER
009288

RELEASE CIRCUIT TEST PLUG
Part No. 440912

Replaces a PAD for testing the CHECKFIRE 210 System. See Figure 2-44.



FIGURE 2-44
RELEASE CIRCUIT TEST PLUG
009289

Bracket Mounting Instructions (Continued)

NOTICE

Only hand-tighten enclosure nut, do not use mechanical force such as a wrench.

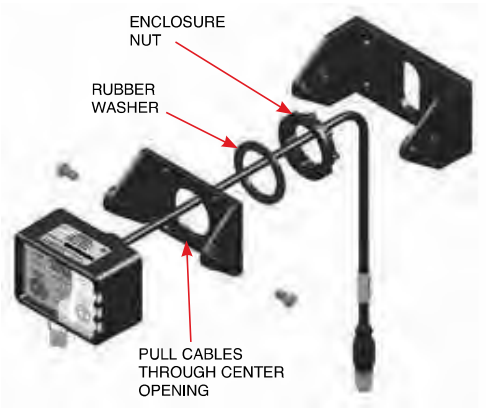


FIGURE 5-7
ENCLOSURE NUT
009310

7. If required, feed cables through opening in bracket base. Reinstall the Swivel Mount to the base according to the position determined in Step 1. Carefully align joint teeth and secure with the swivel joint screws to lock swivel mount in place. Do not over tighten, 20-25 in-lbs (2.26-2.82 N•m) maximum. See Figure 5-8.



FIGURE 5-8
MOUNTING BRACKET WITH CHECKFIRE 210 DISPLAY MODULE
009311

MOUNTING INTERFACE CONTROL MODULE (ICM)

Mount on a flat surface that will properly support the ICM during all vehicle/equipment operating and environmental conditions (e.g. shock and vibration).

1. Refer to layout drawing for planned location. Verify the location meets approval of the vehicle/equipment owner and/or vehicle/equipment service manager.
2. Confirm access to the ICM for proper cable connections, periodic inspections, and maintenance. Verify module location and connections will not interfere with vehicle/equipment operation, service, and maintenance.
3. Using the ICM mounting plate as a template (see Figure 5-9), mark and drill 9/32 in. (7 mm) holes in the flat surface (4 places).
4. Secure ICM to mounting surface using appropriate length fasteners (1/4 in. (6 mm) screws or bolts with lock washers and nuts).



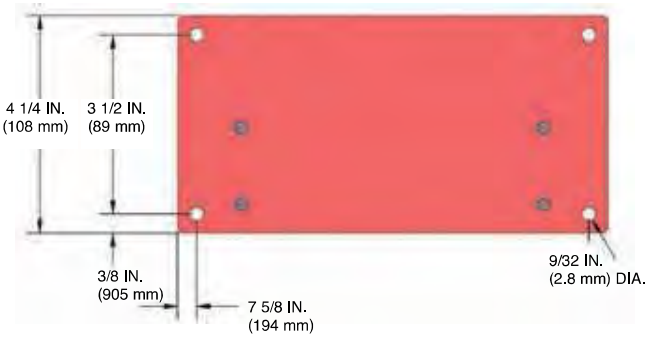


FIGURE 5-9
SURFACE MOUNTING
009273 / 009312

TABLE 5-3: MANUAL PROGRAMMING OPTIONS (Continued)

TDR-9, Time Delay Restarts for TD1

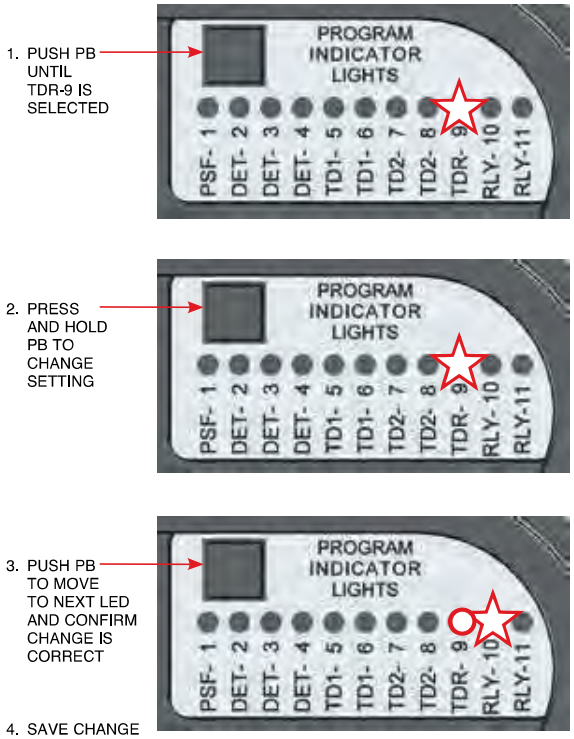
TDR-9 changes the number of times TD1 can be restarted from the display module between 2 restarts (default programming – OFF) and unlimited restarts (ON). TD1 is the time delay period between an alarm condition and TD2.

1. If the system plan requires unlimited restarts and TDR-9 is OFF, push programming button until TDR-9 is selected (pulsing at a rate of 1 x 1 second).

⚠ WARNING

Delay of system operation may allow the fire to intensify, which could result in a more difficult fire to suppress.

2. Press and hold the programming button for more than 1 second to turn ON TDR-9 and specify the unlimited restarts function. The 1 x 1 second pulse is now twice as long.
3. Push the programming button to move to the next LED and confirm
   - TDR-9 is steady-on
   - RLY-10 is pulsing 1 x 1 second.
4. Save the ICM programming change.
   Reset to Normal: Press and hold "DELAY/Reset/Silence" button for 3 seconds; Green and Red LEDs are steady-on for 1 second; then Amber LEDs are steady-on for 1 second; at end sounder quickly pulses 3 times.



RLY-10, Relay #1, Alarm/Fault

RLY-10 changes the function of Internal Relay #1 between an Alarm relay (default – OFF) and a Fault relay (ON). Alarm functionality responds to an alarm condition. When programmed to the Fault functionality, a fault condition transfers the relay contacts. In both cases, the relay will return to normal once the alarm condition or fault clears.

1. If the system plan requires Relay #1 to function as a Fault relay and RLY-10 is OFF, push programming button until RLY-10 is selected (pulsing at a rate of 1 x 1 second).
2. Press and hold the programming button for more than 1 second to turn ON the LED and specify the Fault relay function. The 1 x 1 second pulse is now twice as long.
3. Push the programming button to move to the next LED and confirm
   - RLY-10 is steady-on
   - RLY-11 is pulsing 1 x 1 second.
4. Save the ICM programming change.
   Reset to Normal: Press and hold "DELAY/Reset/Silence" button for 3 seconds; Green and Red LEDs are steady-on for 1 second; then Amber LEDs are steady-on for 1 second; at end sounder quickly pulses 3 times.

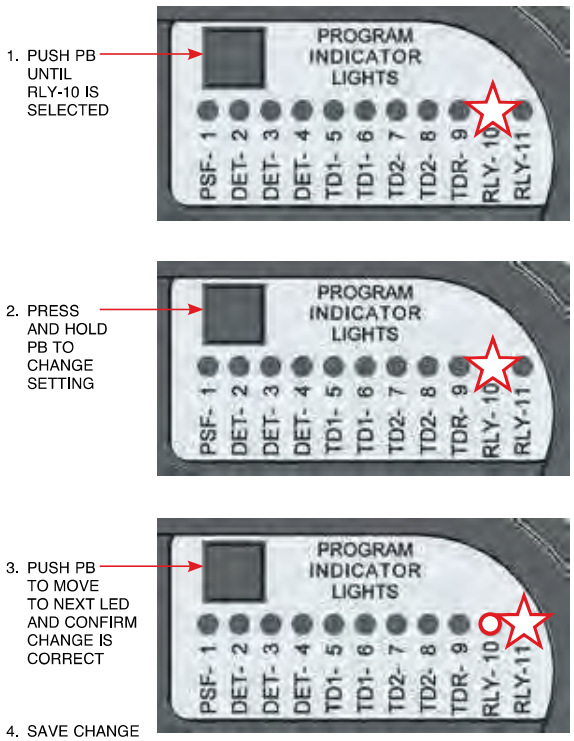


TABLE 6-3: OPERATIONAL TEST (Continued)

Electric Manual Actuator (EMA) Test (Continued)

5. Reset EMA by pulling red strike button up to set position, re-install ring pin. Do not reseal at this time.
6. Reset RCT.
7. Reset to Normal: Press and hold "DELAY/Reset/ Silence" button for 3 seconds; Green and Red LEDs are steady-on for 1 second; then Amber LEDs are steady-on for 1 second; at end sounder quickly pulses 3 times.
8. Repeat Test for each remaining EMA following above steps.

CAUTION

If the system includes Pneumatic Manual Actuator(s), test these components separately in accordance with the appropriate system manual (latest edition):

LT-A-101-10/20/30 Manual (Part No. 24327)

LT-A-101-50/125/250 Manual (Part No. 427865)

LVS Manual (Part No. 427109)

The actuators also have ring pins and red strike buttons. Actuation can cause fire suppression system release.

RESET EMA:
PULL RED BUTTON UP,
INSERT RING PIN



009217

RETURN TO NORMAL STATUS

RESET RCT, AND MODULE

POWER LED IS GREEN STEADY-ON



009290

TABLE 9-7: SPECIFIC CIRCUIT TESTING PROCEDURES (Continued)

Release Circuit

If Release LED is pulsing AMBER indicating a release circuit fault and cannot be cleared check release circuit cable.

Required Test Equipment (Confirm test equipment is new and functioning properly)

- 2 - Release Circuit Terminators (Part No. 439436)
- Release Circuit Test Plug(s) (Part No. 440912) – one for each PAD

1. Power down system.
2. Replace all PADs with Release Circuit Test Plugs.
3. Power up system.
4. If fault clears, there is at least one faulty PAD. Repeat above steps (1- 3) for each PAD except at step 2 replace 1 Release Circuit Test Plug with a PAD one at a time to determine the faulty PAD.
5. If fault does not clear, disconnect Release Circuit Cable at the blue ICM release receptacle. Install Release Circuit Terminator directly to the receptacle on the ICM. If Release LED continues pulsing AMBER, there is an internal problem and the CHECKFIRE 210 ICM must be replaced.

⚠ CAUTION

When handling the PAD, always point actuating end away from yourself and others. On electrical initiation, PAD operates very quickly and a small brass disk forcefully separates from actuating end. Physical injury may occur from contact with the actuating pin and/or the detaching disk.

1. POWER DOWN
2. REPLACE ALL PADS WITH TEST PLUGS
3. POWER UP
4. IF FAULT CLEARS, CHECK FOR FAULTY PAD.



009239



009289

5. IF FAULT DOES NOT CLEAR, INSTALL TERMINATOR; IF FAULT CONTINUES, REPLACE ICM

RELEASE CIRCUIT RECEPTACLE, INSTALL TERMINATOR



009338

NOZZLE COVERAGE AND LOCATION

The first step is to determine which nozzles are needed and where they should be placed to best protect the hazard.

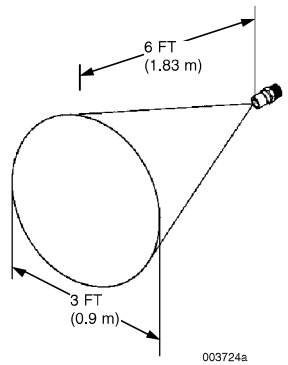
Nozzle selection can be made by first determining the size of the hazard and then comparing that to the nozzle's effective discharge pattern.

C-1/2 Nozzle Part No. 53791 – The cone-shape discharge pattern of the C-1/2 nozzle will widen to a 3 ft (0.9 m) diameter at the maximum effective discharge range of 6 ft (1.8 m). See Figure 1.

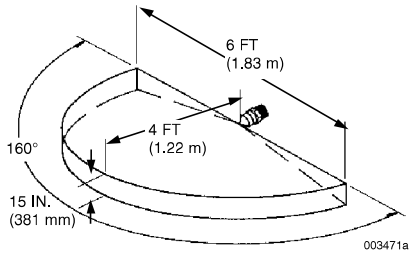
V-1/2 Nozzle Part No. 56748 – The V-1/2 nozzle creates a fan-shaped discharge pattern of 160° and has a maximum effective discharge range of 4 ft (1.2 m) in length by 15 in. (381 mm) in height with a maximum width of 6 ft (1.8 m). See Figure 1.

F-1/2 Nozzle Part No. 16449 – The F-1/2 nozzle also produces a fan-shaped discharge pattern, but with a 180° pattern at a maximum effective range of 33 in. (838 mm) in length by 15 in. (381 mm) in height with a maximum width of 5 ft 6 in. (1.7 m). See Figure 1.

C-1/2 NOZZLE



V-1/2 NOZZLE



F-1/2 NOZZLE

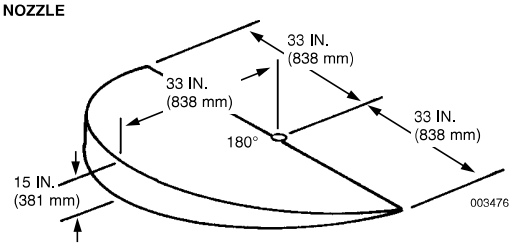


FIGURE 1

NOTICE

When using any of the nozzle types, make certain no obstructions interfere with the discharge pattern as it is directed to the hazard

The following rules apply to selecting nozzles and nozzle locations:

- When choosing the proper nozzle, remember the entire hazard area must be within the nozzle's pattern and maximum effective discharge range.
- The narrow pattern and longer discharge range of the C-1/2 nozzle make it a good selection for protecting small areas or hazards that are distant from the nozzle mounting location.
- Larger hazard areas may require the use of V-1/2 or F-1/2 nozzles.
- Some areas may exceed the area coverage of one nozzle and may require an additional nozzle(s) for protection.
- In some cases, a single nozzle can cover more than one area of a common hazard such as a transmission and torque converter. **Note:** Both areas must be within the discharge pattern of the nozzle.
- When planning nozzle locations, make certain the effective flow of dry chemical to all recognized hazard areas will not be obstructed.
- If obstructions cannot be avoided, an additional nozzle(s) may be needed to provide proper coverage.
- Nozzle placement should be such as to avoid impinging discharge patterns that may reduce nozzle's effective range.
- Never settle for less than full coverage of each fire hazard.

After establishing nozzle locations and number required, the quantity of LT-A-101-50/125/250 tanks can be determined.

TANK QUANTITY AND SIZE REQUIREMENTS

Knowing the number of nozzles required, next determine the number and size of tanks required.

Tank Quantity

Each LT-A-101-50/125/250 tank requires the use of a specific number of nozzles. These quantities of nozzles must be used for proper agent distribution. Note: 24 nozzle systems are allowed only on LT-A-101-250 size tanks.

Match nozzle groups of 8, 12, or 16 to individual tanks. If the last group of nozzles is not equal to 8, 12, or 16, additional nozzles must be added to the system design so that all tanks include an 8, 12, or 16 nozzle piping distribution network.

Exception: An LT-A-101-50 can utilize a 4 nozzle system for extended discharge.

Tank Size

The LT-A-101-125 tank will discharge dry chemical for approximately 10 seconds where 16 nozzles are used. If, during the hazard analysis it was determined that more time is required to allow the operator to safely egress the vehicle, then the LT-A-101-250 tank can be utilized. This agent tank contains twice the amount of dry chemical, therefore it offers a discharge time of approximately 20 seconds.

When the number of tanks have been determined based on the number of nozzles for total protection, the next step in the design process is to determine the distribution hose network required.

INSPECTION

Inspection is a "quick check" that the system is operable. It is intended to give reasonable assurance that the system is fully charged and will operate. This is done by seeing that the system has not been tampered with and there is no obvious physical damage, or condition, to prevent operation. The value of an inspection lies in the frequency, and thoroughness with which it is conducted.

Inspection frequency shall be performed monthly, or sooner, depending on operating and/or environmental conditions.

To provide reasonable assurance that your ANSUL LT-A-101-50/125/250 system is charged and operable:

1. Note general appearance of system components for mechanical damage or corrosion.
2. Check all hose to make certain it is securely fastened and not cut or show signs of abrasion.
3. Make certain all hose fittings are tight.
4. Make certain the nozzles are correctly aimed, openings are clean and not obstructed and the blow-off caps are properly installed. If nozzles appear to be aimed improperly, immediately contact the authorized ANSUL distributor. **Note:** Blow-off caps must be replaced annually.
5. Check nameplate(s) and additional remote labels for readability and make certain they are properly attached.
6. Make certain the indicator stem on the fill cap is in the "down" position (LT-A-101-125/250).
7. Check the gauge on the nitrogen cartridge (LT-A-101-125/250). Make certain the arrow is pointing within the correct pressure range.
8. The automatic detection system should be inspected per the instructions listed in the appropriate CHECKFIRE manual. See Section III, "System Components," Page 3-8.
9. Check to make certain hazard size or components being protected have not changed since original installation.
10. If there are any broken or missing lead and wire seals, or any other deficiency is noted, immediately contact the authorized ANSUL Distributor.
11. Keep a permanent record of each inspection.

NOTES:

DETECTION SYSTEM REQUIREMENTS

A properly designed LVS Liquid Agent fire suppression system should include automatic detection and actuation that is designed to automatically detect and suppress a fire that may not be noticed by the vehicle operator until it may be too late. The ANSUL CHECKFIRE SC-N Electric Detection and Actuation System is used for automatic operation in most applications. The detection design and layout must follow the guidelines stated in the CHECKFIRE SC-N Installation, Recharge, Inspection, and Maintenance Manual (Part No. 423522). For certain underground mining vehicle applications, the ANSUL CHECKFIRE MP-N Electric Detection and Actuation System is required. The CHECKFIRE MP-N is utilized in applications where a vehicle may be operating in an explosive methane/air atmosphere. Refer to guidelines stated in the CHECKFIRE MP-N Installation, Recharge, Inspection, and Maintenance Manual (Part No. 427310).

SHUTDOWN REQUIREMENTS

When protecting any vehicle, especially vehicles with large amounts of hydraulic fluid and other flammable fuels on board, the engine, electric motor(s), and/or equipment power must be shut down, hydraulic pumps shut off, and if possible, hydraulic or fuel storage tanks vented. To accomplish this, it may be necessary to wire the shutdown of these devices into the CHECKFIRE SC-N Module Shutdown Relay contacts or LVS system pressure switch contacts.

CAUTION

Before designing for any shutdown or venting method, consult the vehicle manufacturer or dealer, the owner, or the vehicle service department manager for specific instructions on vehicle shutdown options and acceptable method(s) for vehicle shutdown.

The LVS fire suppression system can incorporate several methods that may be used to provide shutdown for the vehicle engine or other equipment requiring shutdown or electrical de-activation. A brief description of various shutdown options are as follows:

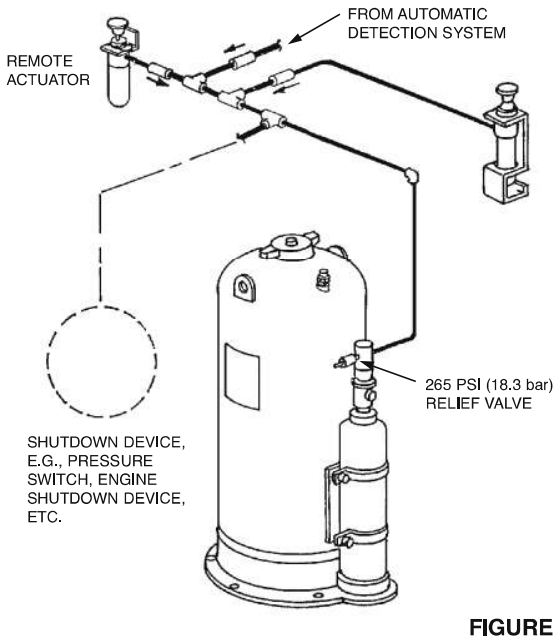
Engine Shutdown (Shutdown Relay or Pressure Switch) – Engine shutdown may be accomplished electrically by one of two means – the CHECKFIRE SC-N control module, using an integral "Shutdown Relay," or the LVS Pressure Switch (Part No. 437409). In many applications, a continuous duty normally energized fuel solenoid (supplied by others) may be used, which is wired in series with the Normally Closed "Shutdown" relay contacts of the CHECKFIRE SC-N Control Module or the LVS system pressure switch. The "Shutdown" relay contacts will transfer (open) after the first time delay cycle is completed in the CHECKFIRE SC-N control module, or when the LVS fire suppression system has operated (when the pressure switch is utilized for shutdown). Any shutdown wiring or connections to the vehicle or vehicle operating systems, or fuel solenoid installation and associated connections, should be performed either by vehicle maintenance personnel, or with their supervision.

Normally Open and Normally Closed contacts in the CHECKFIRE SC-N control module relays or one or more pneumatically operated vehicle pressure switches can be used for various electrical functions to energize or de-energize optional equipment, or operate high level audio alarm and visual strobe devices. Refer to the CHECKFIRE SC-N Installation, Recharge, Inspection, and Maintenance Manual (Part No.423522) for relay use and associated wiring instructions.

Engine Shutdown (Pneumatic Engine Shutdown Device) – Another means available for fuel shutdown in certain vehicles is to pneumatically shutdown the fuel rack by venting the hydraulic pressure through the "safety system." This can be accomplished by installing the ANSUL Engine Shutdown Device (Part No. 427425) in the system actuation line. When the ANSUL fire suppression system is actuated, the actuation pressure opens the check valve located in the engine shutdown device, allowing the safety system pressure to bleed into the holding tank. The drop in pressure causes the valves in the fuel rack to close, thus shutting down the engine. **Note:** This option is not suitable for many off-road vehicle applications. Consult with the vehicle manufacturer or authorized dealer, or vehicle maintenance personnel before choosing this option.

Engine Shutdown (Pneumatic/Mechanical Fuel Shutoff) – An Air Cylinder (Part No. 15733) may be used in applications that incorporate a spring-return fuel shut-off rocker arm, generally located on the side of an engine. The air cylinder is connected to the LVS actuation line with 1/4 in. hydraulic hose and pneumatically operates when nitrogen pressure enters the LVS actuation line. The air cylinder is connected to the spring-loaded rocker arm ▸ by 1/16 in. (2 mm) diameter stainless steel cable. **Note:** This option is not recommended in operating environments where debris can build up in the air cylinder or rocker arm area.

Hydraulic Fluid Tank Venting – It may be possible in some applications to vent pressure in the hydraulic oil tank. Solenoid valves (supplied by others) may be utilized with relay contacts in the CHECKFIRE SC-N control module or switch contacts in the optional vehicle pressure switch assembly. **Note:** This option may not be suitable for certain off-road vehicle applications. Consult with the vehicle manufacturer or authorized dealer, owner, and/or vehicle maintenance personnel before considering this option. Solenoid installation and/or final wiring connections for hydraulic tank venting should be authorized by the owner or service department manager. If possible, installation and connections should be performed by the vehicle maintenance personnel or (with proper instruction and supervision provided by the manufacturer or owner) by qualified vehicle fire suppression system installation personnel.



▸ **FIGURE 4-13**
007061

TYCO FIRE PROTECTION PRODUCTS
ONE STANTON STREET
MARINETTE, WI 54143-2542

Copyright © 2012 Tyco Fire Protection Products. All rights reserved.

Part No. 427109-08

GENERALITES

Contrôle / Réglage	Valeurs	Tolérances
Température de service (capteur t°C huile)	**Entre 50° et 70°**	
Régime diesel nominal	**1840 tr/min**	**-10 / +10**

POMPES DE PILOTAGE

Contrôle / Réglage	Valeurs		Tolérances
Limiteur de pression dans bloc SU1	**32 bar**	*réglage*	**0 / +2**

POMPES DE TRAVAIL

Pompes de travail dans Power-Pack: ***P1, P2, P3***

Contrôle / Réglage	Valeurs		Tolérances
Régulateur de puissance			
Pré-réglage chez le fournisseur (vis de réglage LR plombée):			
pas de nécessité de réglage pour une pompe neuve			
Début de régulation			
Réglage clapets primaires	**90 bar**	*réglage*	0 / +2
YR4 débranchée			
Réglage pression de positionnement	**70 bar**	*réglage*	-2 / +2
(M1 sur P1, M1 sur P2, M1 sur P3)			
Régulateur de débit			
Pré-réglage chez le fournisseur (vis de réglage SD plombée):			
pas de nécessité de réglage pour une pompe neuve			
Début de régulation			
Qmin : Réglage pression positionnement	**< 5 Bar**	-	-
(M1 sur P1, M1 sur P2, M1 sur P3)			
Qmax : Réglage pression positionnement	**> 30 Bar**	-	-
(M1 sur P1, M1 sur P2, M1 sur P3)			
Régulateur de pression			
Réglage par la vis de DA			
Pression DA	**330 bar**		
Réglage clapets primaires	**330 bar**	*réglage*	0 / +5
Mettre les tiges en butée			
Réglage vis de DA	**150 bar**	*réglage*	-10 / +10
(M1 sur P1, M1 sur P2, M1 sur P3)			

POMPES DE ROTATION

Pompe de rotation dans Power-Pack : ***P5***

Contrôle / Réglage	Valeurs		Tolérances
Pression de gavage	**35**	*réglage*	**0 / +2**
Pression DR (accélération)			
Frein fermé, piloter pompe par manipulateur	**380 bar**	*réglage*	**-5 / +5**
Mesure en M1			
(Refaire en pilotant l'autre côté, mesure en M2)			
Pression DR (freinage)			
Débrancher la connexion Y sur P5			
Boucher la sortie du clapet navette			
Frein fermé, piloter pompe par manipulateur			
Mesure en M1	**200 bar**	*réglage*	**-5 / +5**
(Refaire en pilotant l'autre côté, mesure en M2)			
Clapets de surpression	**420 bar**	-	**-**

UNIQUEMENT POUR INFORMATION, NE PAS CONTRÔLER, NE PAS REGLER LES CLAPETS DE SURPRESSION

POMPES DE VENTILATEURS

Pompes dans PP: ***P6.1 (Eau), P6.2 (Huile)***

Contrôle / Réglage	Valeurs		Tolérances
P6.1 : DA en MA2	**105 bar**	*réglage*	**-5 / +5**
Information : Vitesse nominale ventilateur eau : 1300 tr/min			
P6,2 : DA en MA1	**160 bar**	*réglage*	**-5 / +5**
Information : Vitesse nominale ventilateur huile : 1650 tr/min			

MOTEURS DE VENTILATEURS EAU / HUILE

Moteurs de ventilateurs huile: ***MF2***

Moteurs de ventilateurs eau: ***MF1***

Contrôle / Réglage	Valeurs		Tolérances
Clapets secondaires	**300 bar**	-	**-**

UNIQUEMENT POUR INFORMATION, NE PAS CONTRÔLER, NE PAS REGLER LES CLAPETS SECONDAIRES

DISTRIBUTEURS

Distributeurs: ***VB1, VB2,***

Pré-réglage chez le fournisseur (vis de réglage plombées):

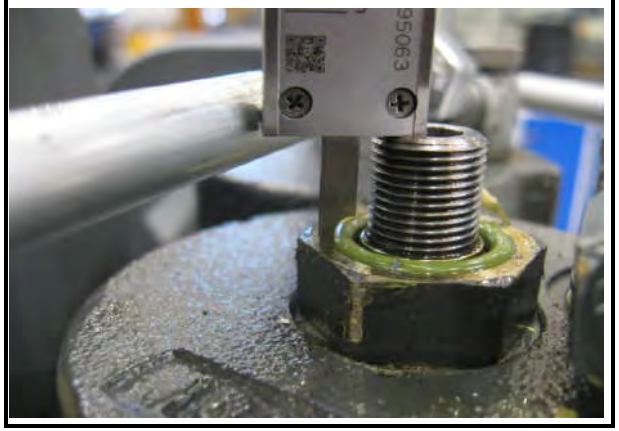
Pas de nécessité de réglage pour un distributeur neuf

Contrôle / Réglage	Valeurs		Tolérances
Clapets primaires	**350 bar**	*réglage*	**-5 / +5**
Clapets secondaires	**380 bar**	*réglage*	**-5 / +5**

REGLAGE VITESSE DESCENTE FLECHE

Tige: ***VB2/3***

Contrôle / Réglage	Valeurs		Tolérances
Course tiges de régénération (VB2/3A)	**12,8 mm**	*réglage*	
	(= 4 tours après avoir dévissé la vis complétement)		



VERTRAULICH

Diese Zeichnung darf ohne unsere Genehmigung weder kopiert noch vervielfaeltigt noch Dritten zugaenglich gemacht werden. Zuwiderhandlungen verpflichten zu Schadenersatz und sind bei Vorsatz strafbar. Alle aus dieser Zeichnung zu entnehmenden Informationen sind geheimzuhalten.

INFORMATION : Unterliegt nicht dem Aenderungsdienst. Aenderungen vorbehalten.

CONFIDENTIAL

This drawing and all information contained herein are property of Liebherr and their use is authorized only in connection with the product for which they were provided. Neither this drawing nor the contents thereof shall be disclosed to any other party for their use without the prior written consent of Liebherr. The use or disclosure of these drawings or the contents thereof for any other purpose is prohibited. Anyone doing so will be held liable thereforce.

INFORMATION : Right of modification reserved. Not Subjected to be updated.

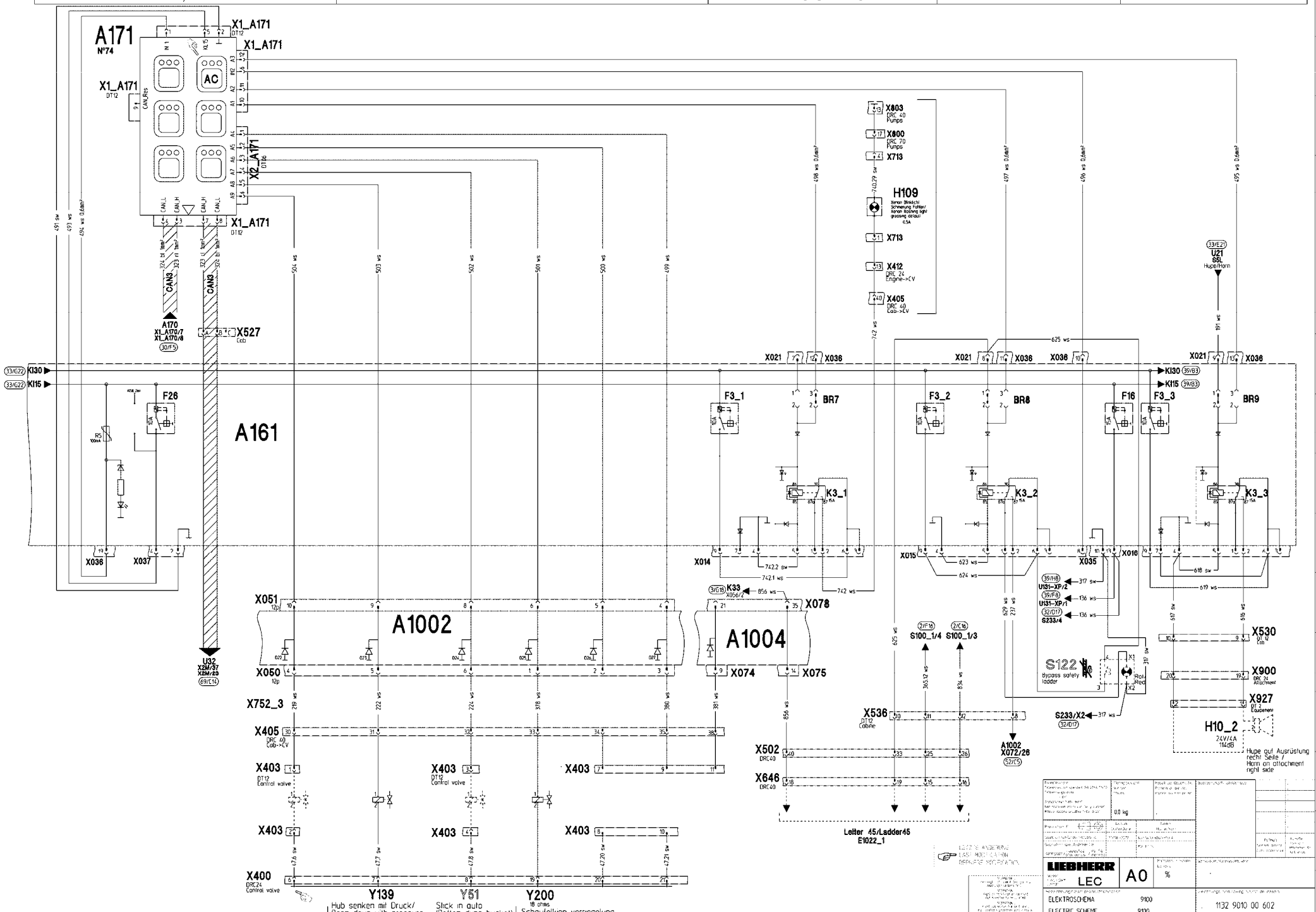
CONFIDENTIEL

Il est formellement interdit de reproduire par n'importe quel moyen le dessin ci-contre et à fortiori de le communiquer à des tiers. Toutes les informations pouvant être tirées de ce dessin doivent être tenues secrètes. Les contrevenants s'exposent à une action en dommage et intérêt et même à des poursuites pénales.

INFORMATION : N'est pas soumis à mise à jour. Modifications possibles sans préavis.

Gezeichnet mit / Drawn with / Dessiné avec: **EXCEL**	LIEBHERR WERK FACTORY USINE **LEC**	**A3**	Gezeichnet / Drawn / Dessiné: **ELI-STOLL A.**	Datum / Date / Date: **24-Jan-2017**	Blatt / Page / Feuille: **1/1**	Bezeichnung / Description / Dénomination: **EINSTELLANWEISUNG ADJUSTMENT INSTRUCTIONS SPECIFICATION DE REGLAGE**
			Geprüft / Inspected / Vérifié: **BONNETOT G.**	Ersatz für / Replacement for / Remplace: **.**		Ident-Nr. / Ident No. / N° d'ident.: **11070844** Zeichnungs-Nr. / Drawing No. / N° de dessin: **1132 7010 30 004**

34	35	36	37	38
Tastatur A171 / Keyboard A171	Steuerschieber Ventile / Control valves	Blinklicht Schmierung Fehler / Flashing Light Greasing Fault	Bausatz Leiter/ Option ladder	Reserve / Reserve



Steuerschieber/ Control valves

LIEBHERR LEC

A0

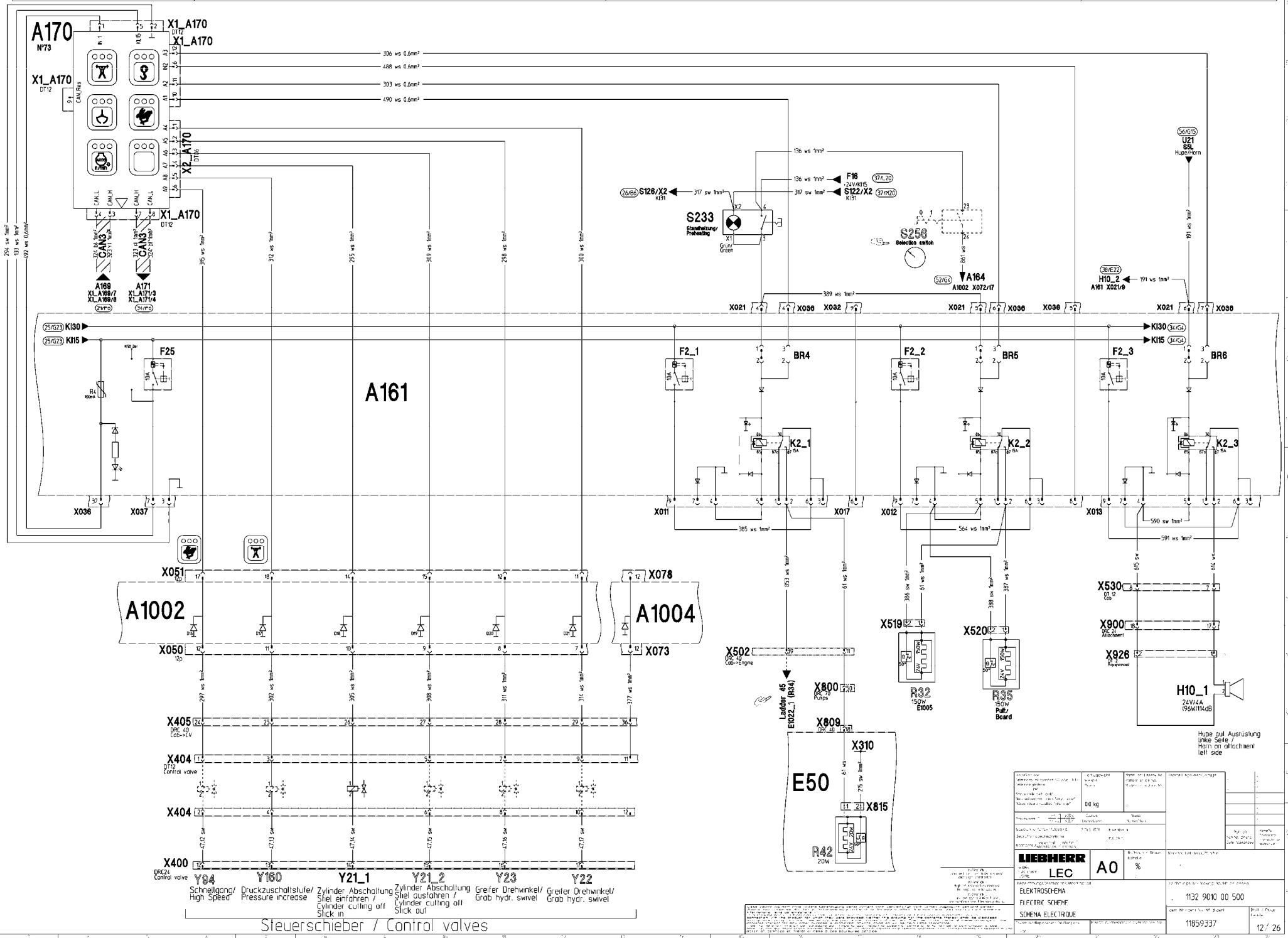
ELEKTROSCHEMA	9100
ELECTRIC SCHEME	9100
SCHEMA ELECTRIQUE	9100

1132 9010 00 602

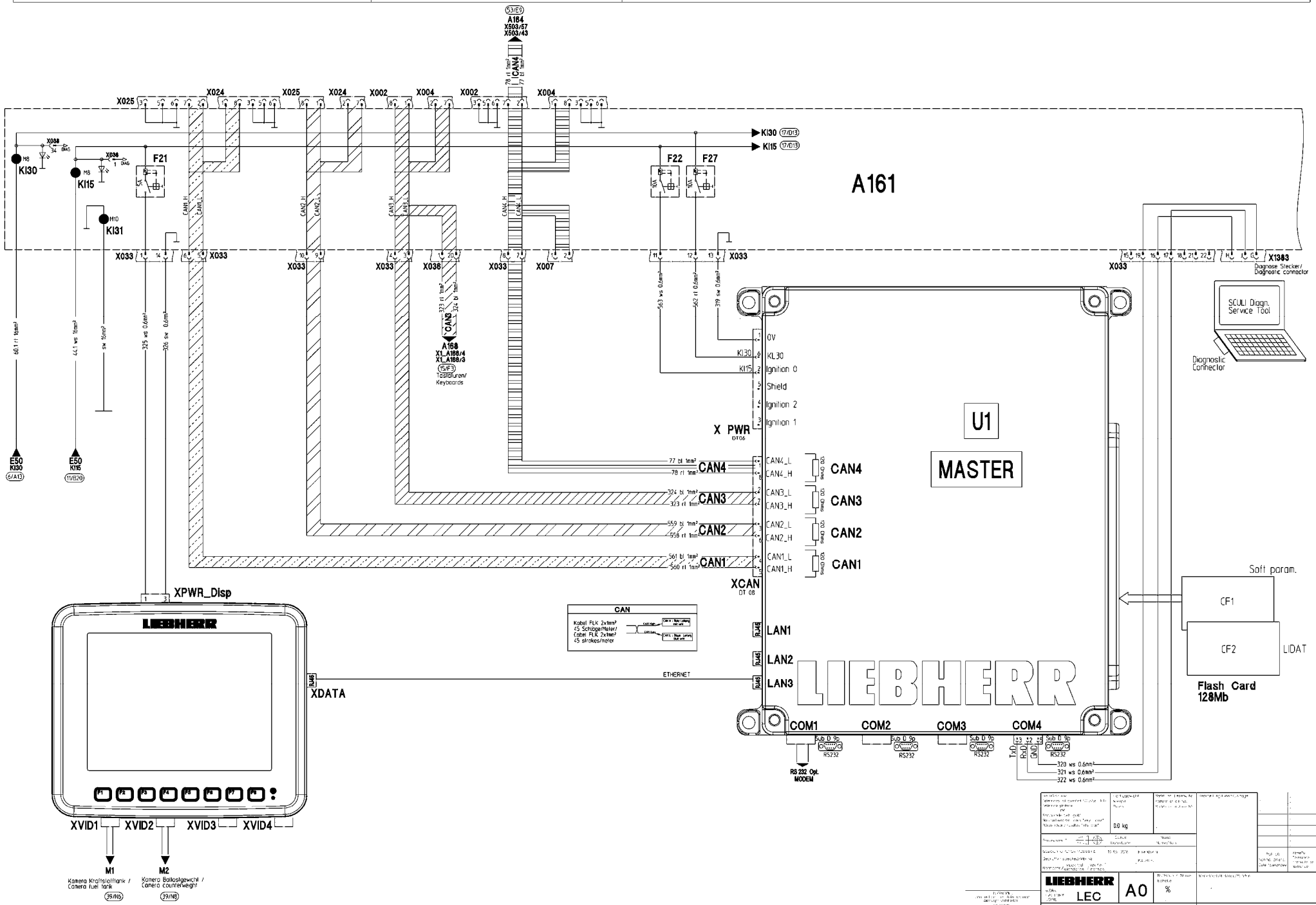
12189590

14 / 27

30	31	32	33
Tastatur A170 / Keyboard A170	Motor Not Steuerung / Engine safety control	Stllstandheizung / Stand heating	Hupe / Horn



12	13	14
Display / Display	CAN3-CAN4 Verteilung / CAN3-CAN4 distribution	Master / Master



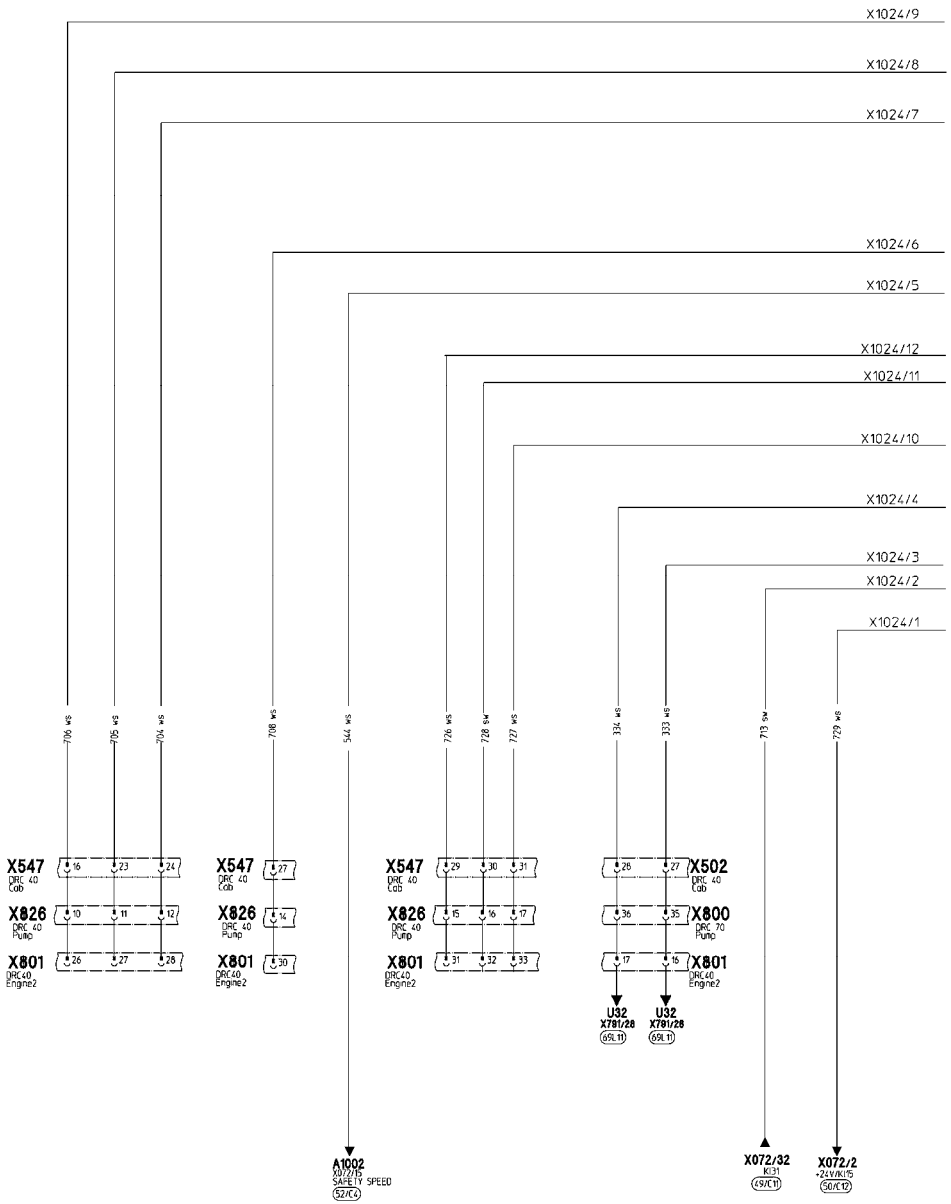
LIEBHERR LEC A0

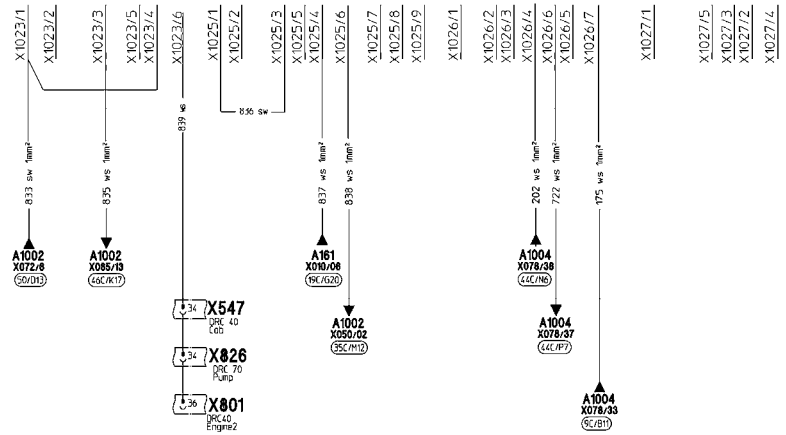
ELEKTROSCHEMA
ELECTRIC SCHEME
SCHEMA ELECTRIQUE

. 1132 9010 00 402

11477469

11 / 37





LIEBHERR

LEC

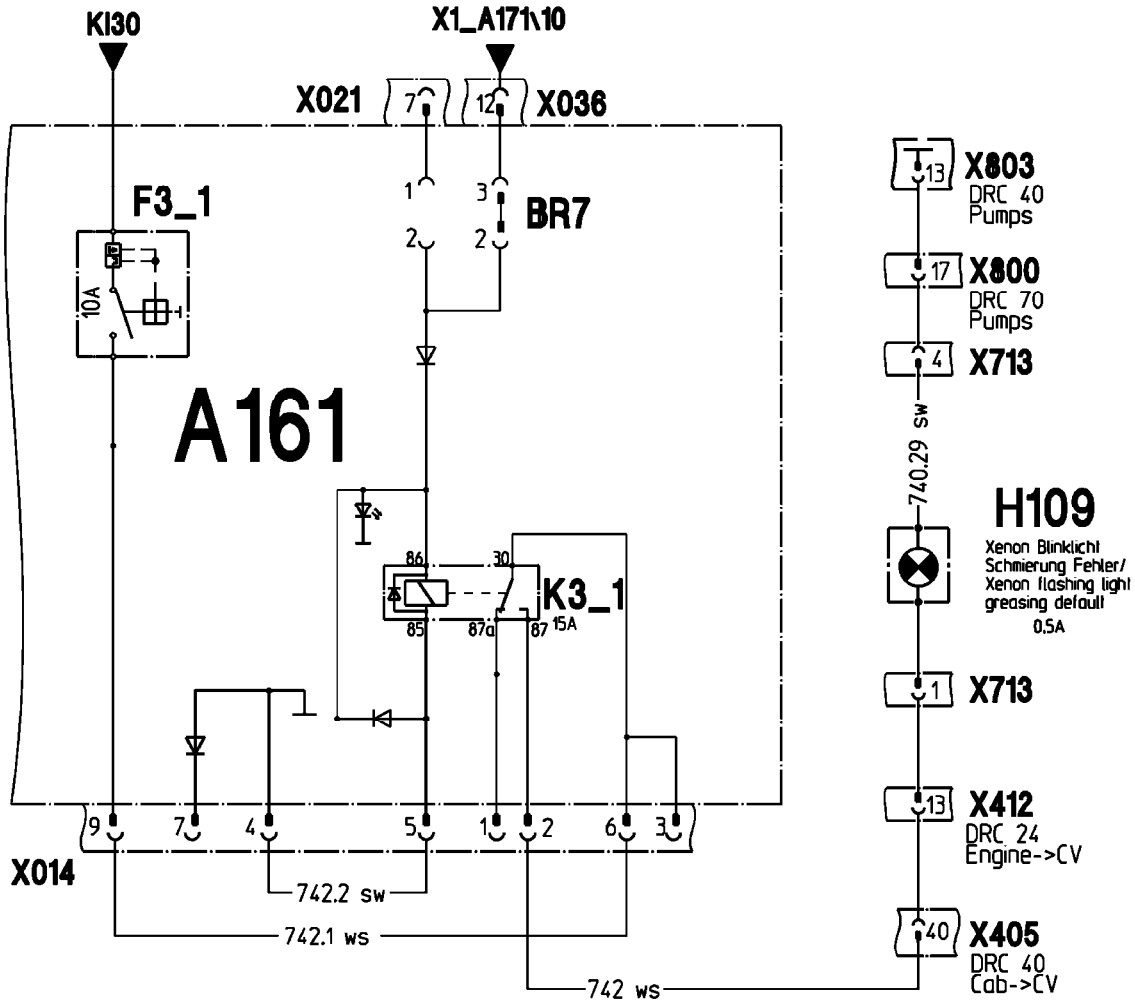
A0

ELEKTROSCHEMA
ELECTRIC SCHEME
SCHEMA ELECTRIQUE

1132 9010 00 402

11477469

36 / 37



LEGENDE

LABEL	DESCRIPTION
*A161	Electric plate
*F3_1	Fuse 10A
H109	Flashing light Greasing Fault
*K3_1	Relay 15A
*X014	Connector 10 poles / A161
*X021	Connector 10 poles / A161
*X036	Connector 37 poles / A161
*X405	Connector 40 poles / Cabine
*X412	Connector 24 poles / Control valve
*X713	Connector 4 poles
*X800	Connector 70 poles / Pumps
*X803	Connector 40 poles / Pumps ground

* Principal schema

Kit gyrophare R9100
Bausatz Blinklicht R9100
Flashing lightkit R9100

INFORMATION :
unterliegt nicht dem Änderungsdienst,
Änderungen vorbehalten.

INFORMATION :
Right of modification reserved
Not sujected to be updated

INFORMATION :
n'est pas soumis à mise à jour,
modifications possibles sans préavis.

Diese Zeichnung darf ohne unsere Genehmigung weder kopiert noch vervielfältigt noch Dritten zugänglich gemacht werden. Zuwiderhandlungen verpflichten zu Schadenersatz und sind bei Vorsatz strafbar. Alle aus dieser Zeichnung zu entnehmenden Informationen sind geheimzuhalten.
This drawing and all information contained herein are the property of Liebherr and their use is authorized only in connection with the product for which they were provided. Neither this drawing nor the contents thereof shall be disclosed to any other party for their use without the prior written consent of Liebherr. The use or disclosure of these drawings or the contents thereof for any other purpose is prohibited, anyone doing so will be held liable therefore.
Il est formellement interdit de reproduire par n'importe quel moyen le dessin ci-contre et d'en faire de le communiquer à des tiers. Toutes les informations pouvant être tirées de ce dessin doivent être tenues secrètes. Les contrevenants s'exposent à une action en dommage et intérêt et même à des poursuites pénales.

Freimaßtoleranz Tolerances not specified ISO 2768 T1+T2 Tolérance générale - mK Stahlbauteile "sehr grob" Non-machined dimensions "very coarse" Pièces mécano-soudées "très large"	Fertiggewicht Weight Poids 0.0 kg	Modell ad. Gesenk Nr. Pattern or die No. Modèle ou matrice N° .
Projektion E	Datum Date/Date	Name Name/Nom
Gezeichnet/Drawn/Dessiné	6-Dec-2016	HOPP P.
Geprüft/Inspected/Vérifié		STRIETZEL M.
Normgepr./ Inspected standards / Vérifié normes		

Bearbeitung/Finish/Usinage

.	.
.	.
.	.
.	.
.	.
Paßmaß Nominal dimens. Cote tolérancée	Abmaße Tolerance Intervalle de tolérance

LIEBHERR
WERK FACTORY USINE LEC

A3

Maßstab / Scale
Echelle
. %

Werkstoff/Material/Matière
KEIN-NONE-SANS

Bezeichnung/Description/Dénomination
ELEKTROSCHEMA BAUSATZ
ELECTRIC SCHEME ACCESSORIES
SCHEMA ELECTRIQUE OPTION

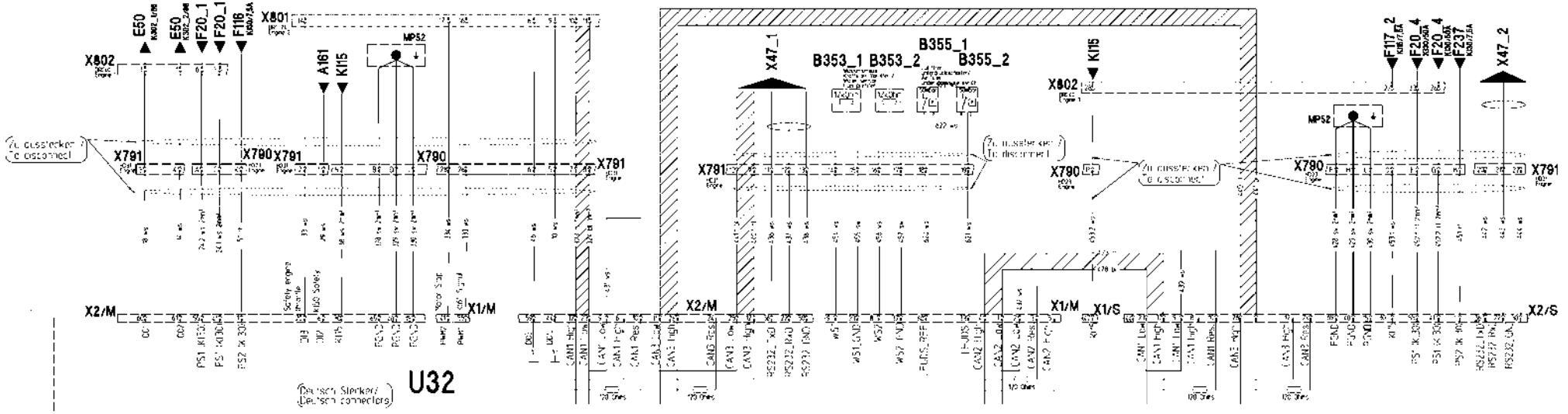
Zeichnungs Nr/Drawing No./N° de dessin
. 1132 9010 48 000

Ersatz für/Replacement for/Remplace

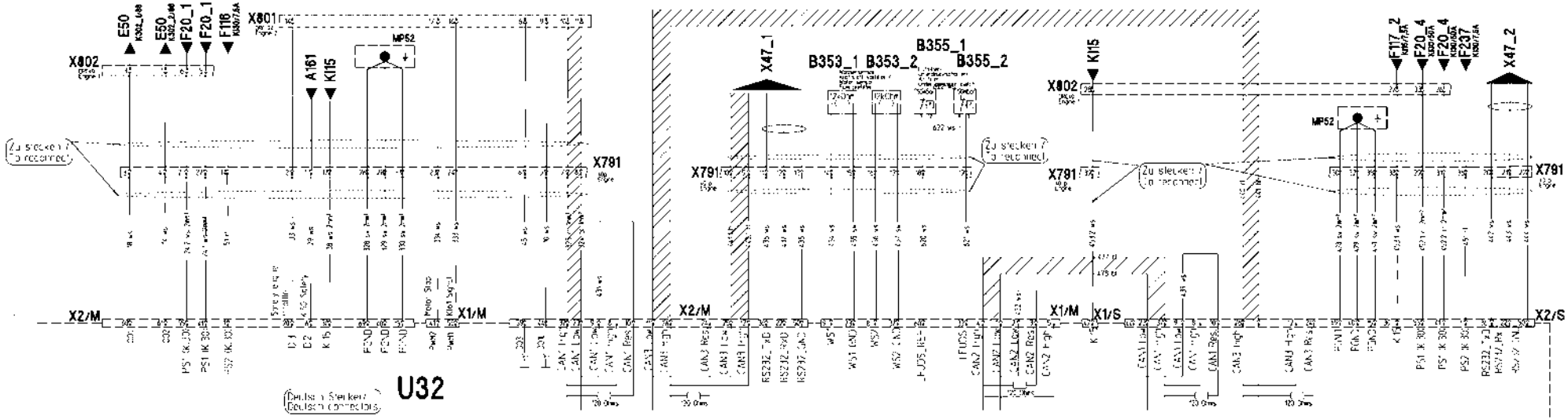
Ersetzt durch/Replaced by/Remplacé par

Ident Nr./Ident No./N° d'ident.
12187671

Blatt / Page
Feuille
1 / 1

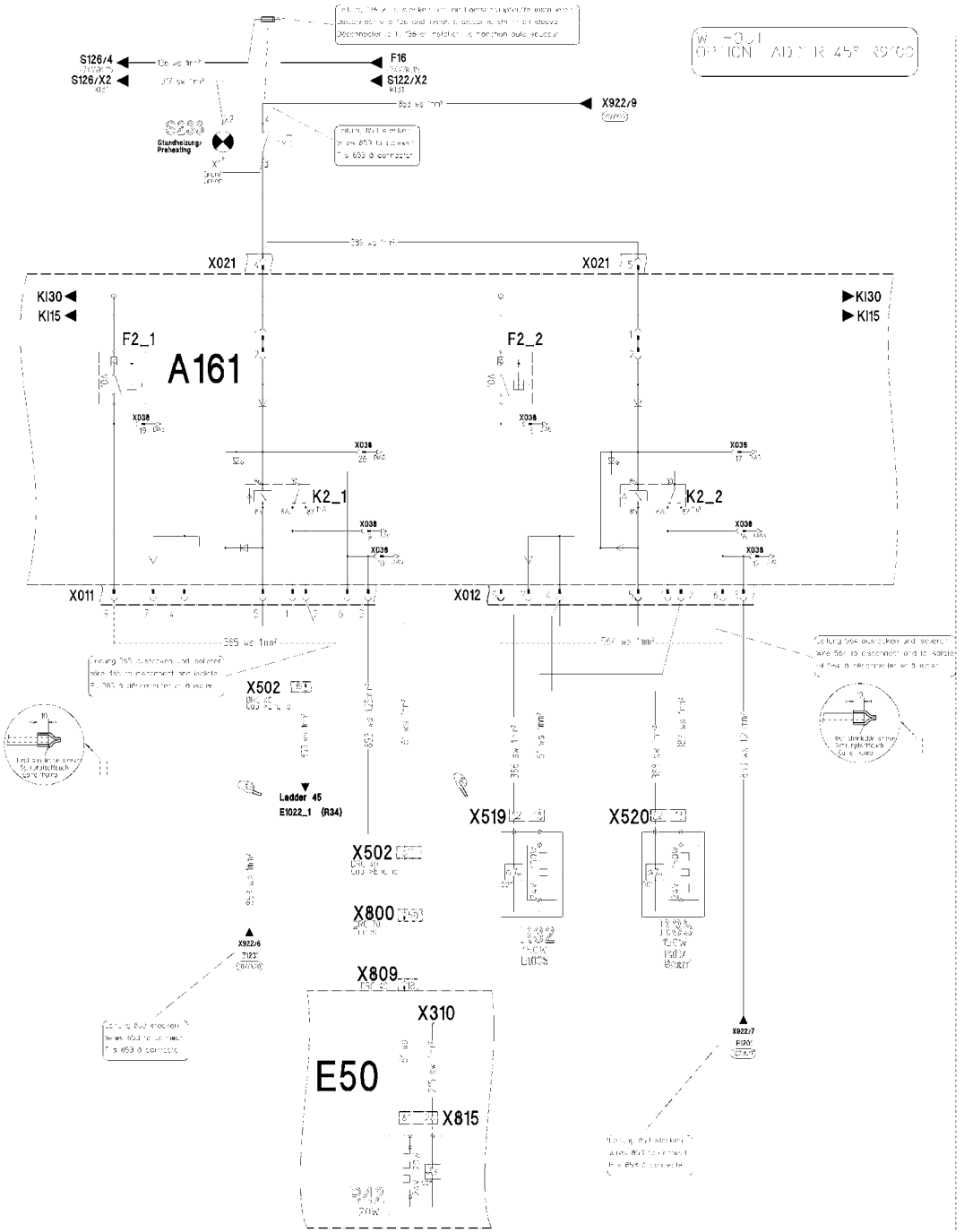


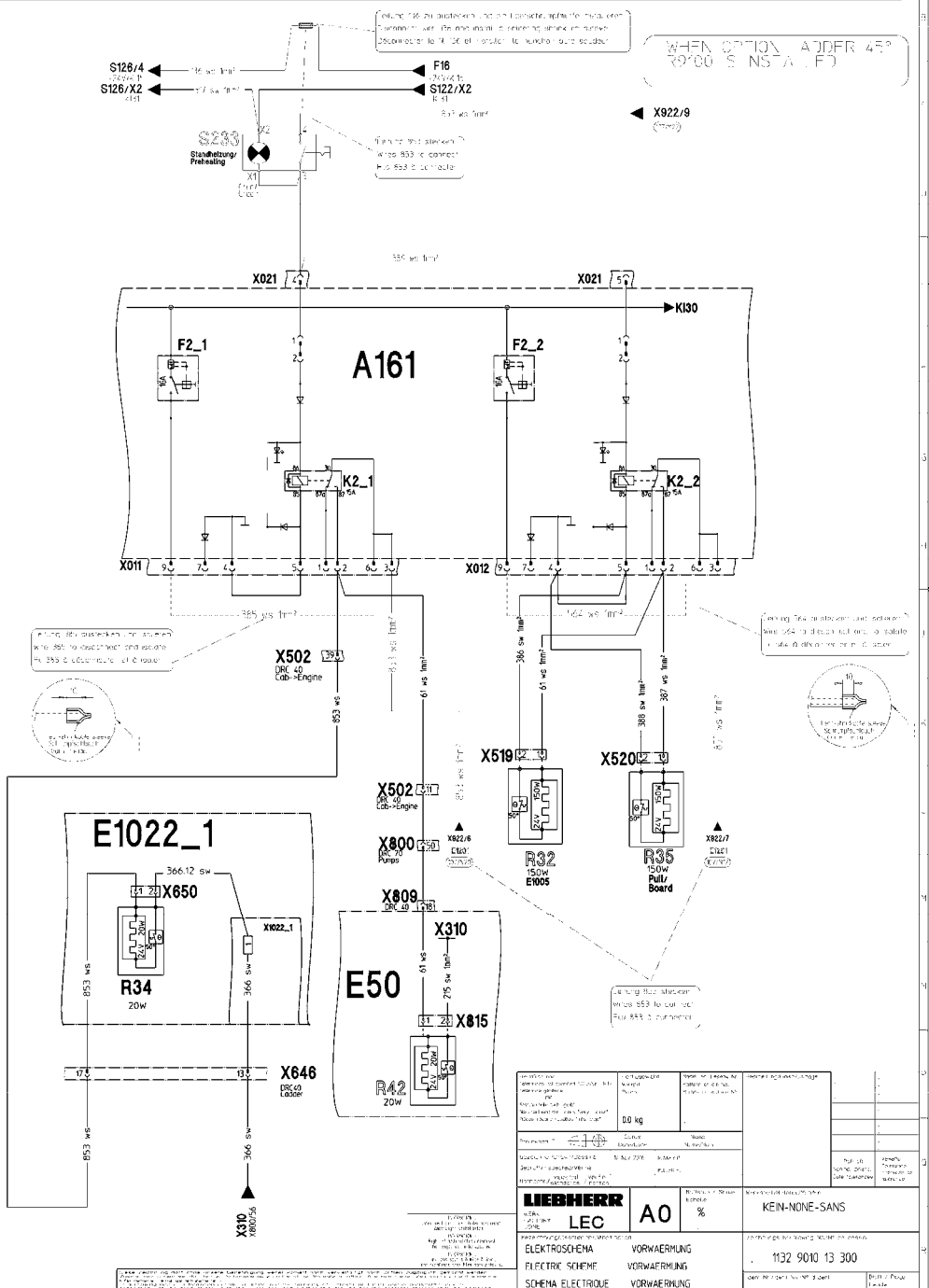
Brancher comme après
Verkuppeln wie folgt
To connect as follows



Motor Stecker Ersatz-kit R9100/R9150
Engine plug change R9100/R9150

LIEBHERR
LEC
A0


S126/4
S126/X2
F16
S122/X2
X922/9
S233
Standheizung/
Preheating
X021
X021
KI30
KI15
F2_1
A161
F2_2
K2_1
K2_2
X011
X012
X502
DRC 40
Cab->Engine
Ladder 45
E1022_1 (R34)
X519
X520
X800
DRC 70
Pumps
X809
DRC 40
X310
E50
X815
X922/6
X922/7


S126/4
S126/X2
F16
S122/X2
X922/9
S233
Standheizung/
Preheating
X021
X021
KI30
F2_1
A161
F2_2
K2_1
K2_2
X011
X012
X502
DRC 40
Cab->Engine
X519
X520
R32
150W
E1005
R33
150W
Pulr
Board
E1022_1
366.12 sw
X650
R34
20W
X1022_1
X646
DRC40
Ladder
X800
DRC 70
Pumps
X809
DRC 40
E50
X310
X815
R42
20W
X310
X800/56
LIEBHERR
LEC
A0
KEIN-NONE-SANS
ELEKTROSCHEMA VORWÄRMUNG
ELECTRIC SCHEME VORWÄRMUNG
SCHEMA ELECTRIQUE VORWÄRMUNG
1132 9010 13 300
12187233
5 / 8

CLICK HERE TO DOWNLOAD THE COMPLETE MANUAL

- Thank you very much for reading the preview of the manual.
- You can download the complete manual from: www.heydownloads.com by clicking the link below



- Please note: If there is no response to CLICKING the link, please download this PDF first and then click on it.

CLICK HERE TO DOWNLOAD THE COMPLETE MANUAL