en

Service Manual

Hydraulic excavator
P 9250 E

from serial number 25312

Document identification

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Manufacturer: Liebherr-Mining Equipment Colmar SAS

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Conformity: CE

Address

Liebherr-Mining Equipment Colmar SAS

49 rue Frédéric Hartmann

LEC / en / Edition: 05 / 2019

solate machine for hydraulic repair

	Hazards identified	Precautions to be taken	Illustrations	Tools	Check Off
k-				PPE	☐
	Mobile lifting devices may have trouble with uneven ground	Fill holes and remove rocks from work area Make work area flat Grade work area if necessary		Grader	☐
	Attachment could creep Potential hydraulic pressure	Park machine where attachment can not creep down Make sure mechanical stops are supporting weight and/or bucket flat on ground			☐

oment is large and heavy. It is mandatory that all work be done in a safe manner.
out a procedure, always check with your supervisor before proceeding.

azards identified	Precautions to be taken	Illustrations	Tools	Check Off
oad balancing rushing verhead load	Stabilize the load with ropes hooked to the part being lifted. Keep clear of the load. Do not let oneself be trapped between the load and an obstacle. Never walk under a suspended load. Inform others of the lifting. Do not lift the load higher than necessary			☐
oad balancing rushing verhead load oad topling over or nhooking when laid it own	Stabilize the load with ropes hooked to the part being lifted. Keep clear of the load. Do not let oneself be trapped between the load and an obstacle. Never walk under a suspended load. Inform others of the lifting. Do not lift the load higher than necessary Make sure the load is lowered on a stable ground. Lower slowly, taking care of the stability of the load. Keep clear			☐

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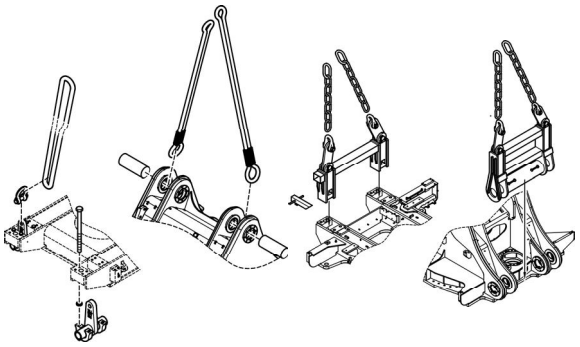
Uppercarriage lifting and transport

	Hazards identified	Precautions to be taken	Illustrations	Tools	Check Off
s-	Attachment failing Attachment not properly secured to the uppercarriage	Ensure that all bolts are properly tightened Ensure that all securing device are properly set			☐
	Wrong lifting point Heavy load, slings failing Imbalanced load	Use lifting attachment in place Use proper lifting procedures and equipment For new tool use (left), see the tool instruction manual For old tool use (right) and weight of component see the service manual, technical data chapter.			☐
	Faulty positionning	Ensure that uppercarriage properly positionned with regard to center of gravity.			☐
	Faulty anchoring Anchor lines failing	Use defined anchor points See Transport Drawing Use anchor lines in good conditions and adapted to the load			☐

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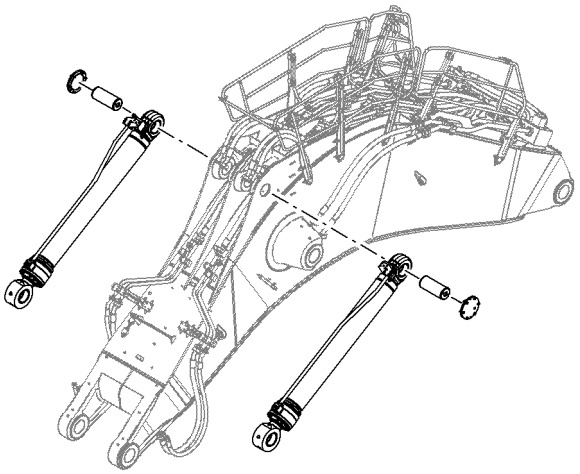
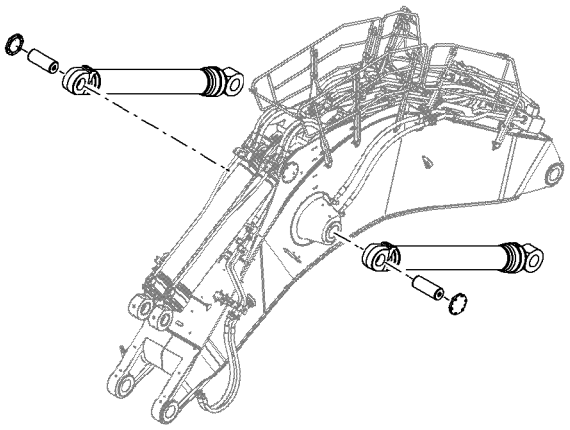
	Hazards identified	Precautions to be taken	Illustrations	Tools	Check Off
	Heavy attachment in movement Crushing Cylinder falling Improper tool 	Keep clear of the load. Rest rod head on wedges See tool listing in service manual for LEC tool ident Ensure tool is in good condition		Pin-puller Cylinder stand Wedges	☐
	Heavy attachment 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	☐

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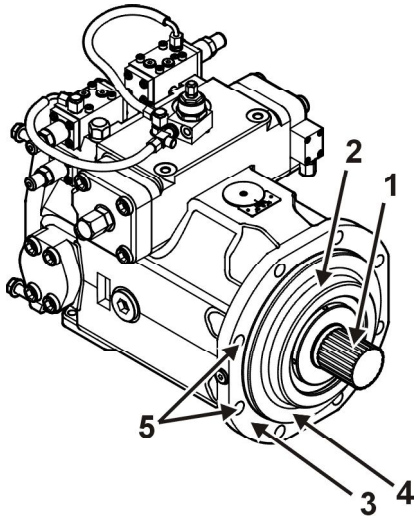
azards identified	Precautions to be taken	Illustrations	Tools	Check Off
amaged surfaces 	Report any damage to the supervisor.		PPE	☐
eavy components	Use correct lifting procedures and equipments Use correct toolling			☐
ool swinging ool and pump falling ver inched fingers 	Keep clear of the path of the tool Maintain the tool in position while changing the hooking point			☐

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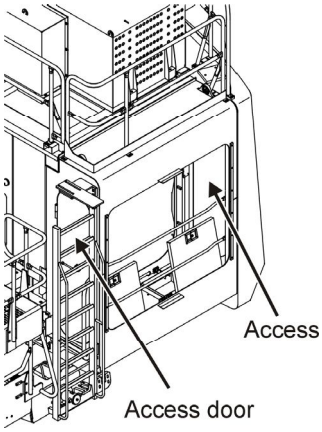
rocedure, always check with your supervisor before proceeding.

Battery maintenance

	Hazards identified	Precautions to be taken	Illustrations	Tools	Check Off
				PPE	☐
t	Falling Object falling during work	Close off all the access that open on the battery compartment with safety tape. Put a safety-cones perim-eter on the ground. Wear and hook a safety harness and be extra carefull not to fall when working with the batteries near the ladder.			
ne ds r-	Chemical splashes 	Batteries contain acid, wear appropriate PPE			☐

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out a procedure, always check with your supervisor before proceeding.

MJF C I F S S

azards identified	Precautions to be taken	Illustrations	Tools	Check Off
il loss	Clean as you work			☐
ersonnel still working n machine eaks	Ensure ALL personnel clear Keep clear			☐
				☐

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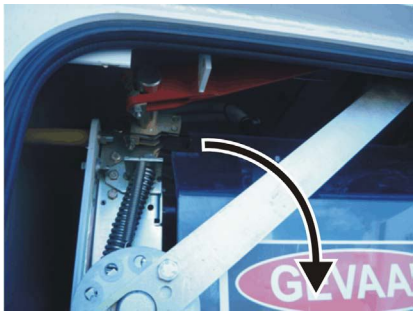
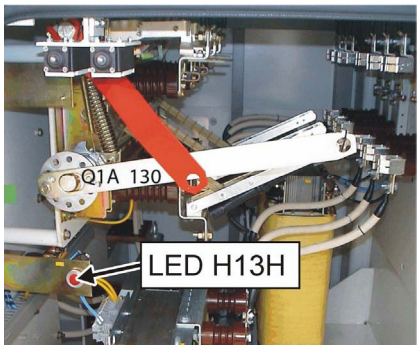
rocedure, always check with your supervisor before proceeding.

lectrical Insulation for Repairs

	Hazards identified	Precautions to be taken	Illustrations	Tools	Check Off
				PPE	☐
m	Heavy equipment in movement	Stand clear			☐
ed					☐

current hazard!
you will have to disconnect all power supplies and secure them from unauthorized reconnection. Therefore check that power is dis-
and bypassed. Cover adjacent live parts or put gates around them. Otherwise, severe injuries or even death could result!
l work be done in a safe manner. To be sure to work safely do insulation level A.
out a procedure, always check with your supervisor before proceeding.

azards identified	Precautions to be taken	Illustrations	Tools	Check Off
igh Voltage anger of death nsulation damage 	Use Face mask, insulated stool and insulated gloves	  	PPE	☐

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rocedure, always check with your supervisor before proceeding.

3.00: Technical data

1 Machine data

1.1 General

General data	Unit	
Machine weight backhoe attachment	t	250
Machine weight shovel attachment	t	253,5
Length without attachment	mm	10240
Width of the undercarriage	mm	6040
Height without attachment	mm	7250
Tail swing	mm	6140
Ground clearance	mm	625
Digging force / breakout force (backhoe attachment)	kN	780 / 859
Crowd force at ground level / max. crowd force / breakout force (shovel attachment)	kN	1050 / 1210 / 935

1.2 Motor

Motor	Unit	
Trademark		General Electric
Model		N 3 RXC 450 K4G
Type		3 phase AC squirrel cage motor
Voltage	V	6000 or 6600
Frequency	Hz	50 or 60
Power Output	kW	1050 (1408 HP)
Nominal speed	RPM	1800 (60 Hz) or 1500 (50 Hz)
Maximal torque (at 1484 RPM)	mN	7722
Motor cooling		Integrated air-to-air heat exchanger
Starting method		Autotransformer (inrush current limited to 2,2 full load current)

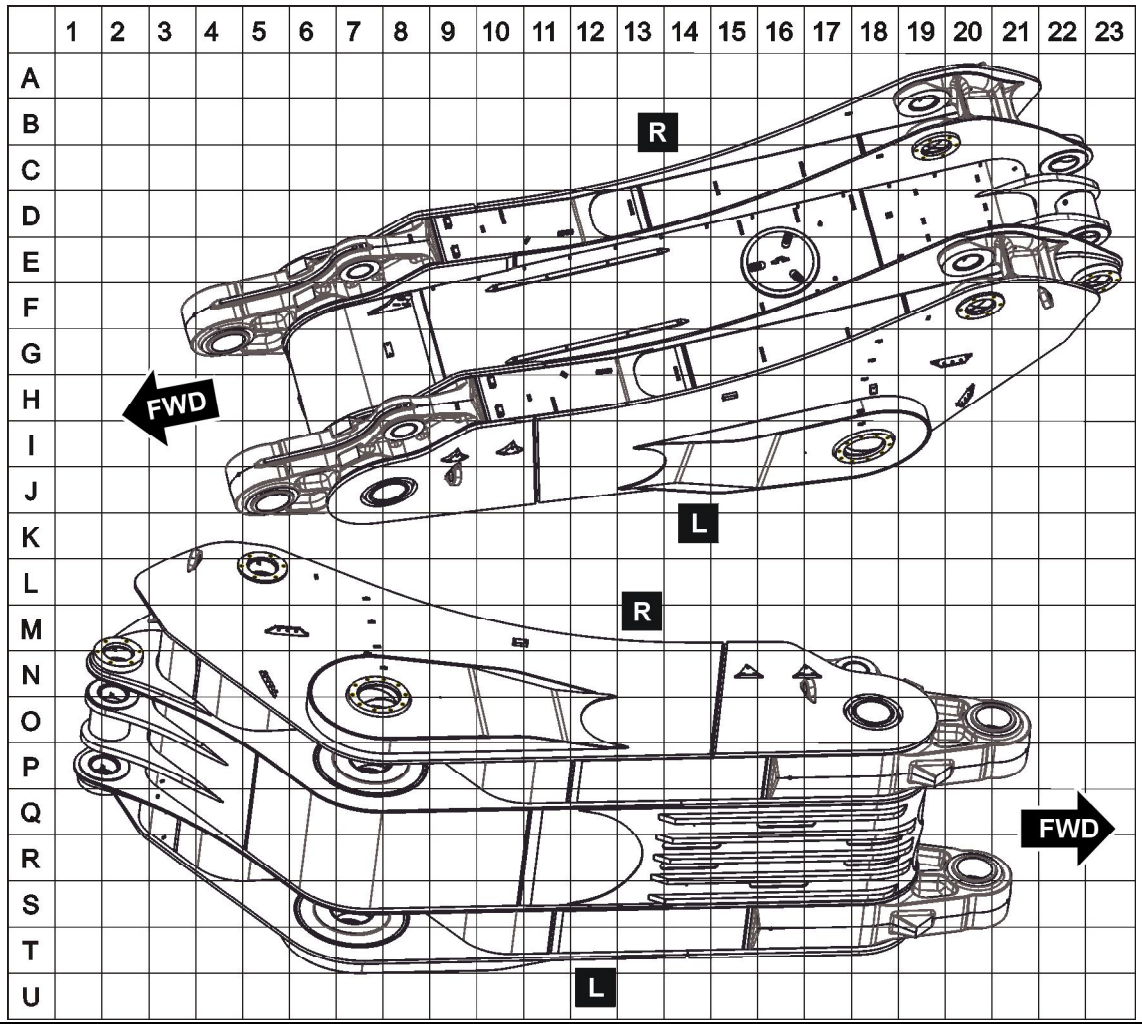
1.3 Splitterbox

Splitterbox	Unit		
Trademark		BOSCH REXROTH	COB
Type		GFC 320 / 1006	68 809 6000
Oil quantity		See Operating Manual	See Operating Manual
Oil viscosity		See Operating Manual	See Operating Manual

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

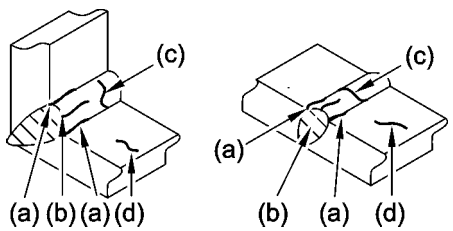
Stick	Article N°:		Index N°:	
	Serial N°:		Component hours:	

▶ 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):

urement uncertainty is defined in the above standard.

1.3.2 Technical description

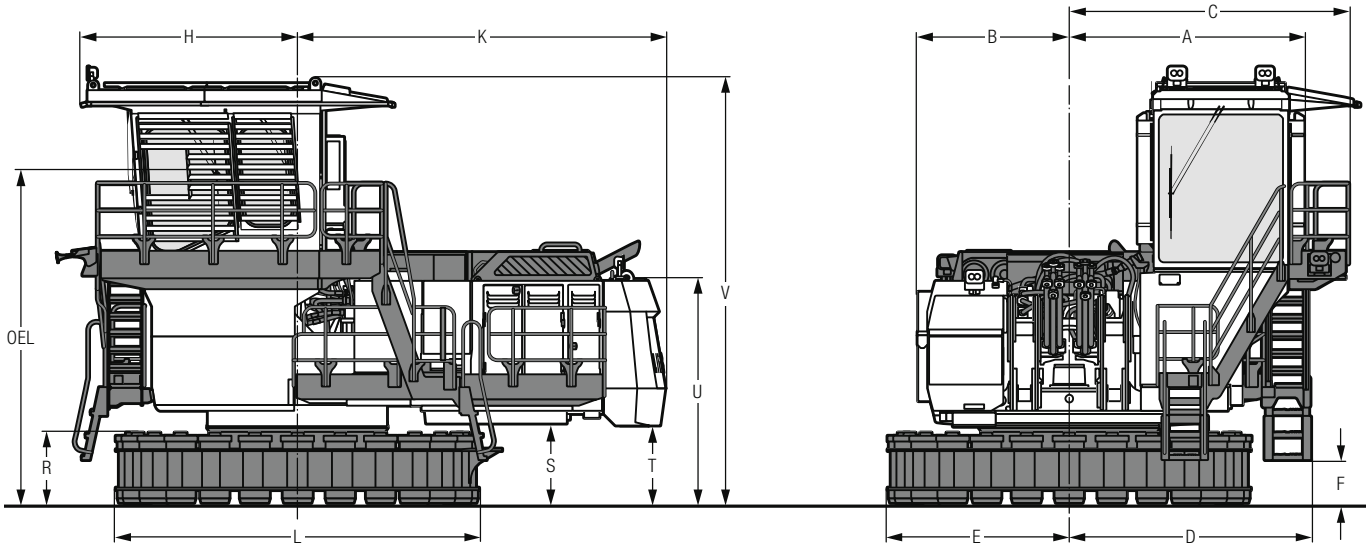
This should be taken from the accompanying technical description.

P 9150

Bucket Range and Dimensions

Boom		Stick		Bucket size		Max depth		Work depth		Stroke at work depth		Digging force (SAE)		Breakout force (SAE)	
m	ft	m	ft	m³	yd³	m	ft	m	ft	m	ft	kN	lbf	kN	lbf
9.3	30.28	4.6	15.1	7.8	10.2	10.4	34.1	9.0	29.5	5.4	17.8	430.0	96,668	570	128,141
		5.7	18.7	7.0	9.2	11.4	37.4	10.0	32.8	6.1	20.0	374.5	84,191	570	128,141
		7.0	22.9	6.0	7.8	12.5	41.0	11.0	36.1	6.5	21.3	328.0	73,737	395	88,800
11.5	37.80	5.7	18.7	5.6	7.3	13.6	44.7	12.0	39.4	6.9	22.7	383.0	86,102	395	88,800
		7.0	22.9	5.2	6.8	14.9	49.0	13.0	42.7	8.0	26.2	330.0	74,187	395	88,800
		8.4	27.6	4.6	6.0	16.1	52.1	15.0	49.2	6.1	20.0	292.0	65,644	430	96,668
14.0	45.94	7.0	22.1	3.2	4.2	17.0	55.9	16.0	52.5	5.2	17.0	335.0	75,311	430	96,668
		8.4	27.6	3.0	3.9	18.5	60.8	17.0	55.9	7.2	23.9	292.0	65,644	430	96,668
		9.5	31.2	3.0	3.9	19.3	63.3	18.0	59.1	6.8	22.3	272.0	61,148	290	65,195

Distance between water level and base plate = 1 m / 3'3"
Considered bulk density: 1.8 t/m³ / 3,035 lb/yd³
Volumes are calculated without any attachment option (extra hydraulic, protections …).
If options impacting the total mass of the attachment are selected, the bucket volumes will decrease accordingly.
Considered bucket protection: standard HD



	mm / ft in
A	2,350 / 7'7"
B	2,100 / 6'9"
C	3,950 / 13'
D	3,300 / 10'8"
E	2,525 / 8'3"
F	580 / 1'9"
H	3,050 / 10'
K	5,060 / 16'6"

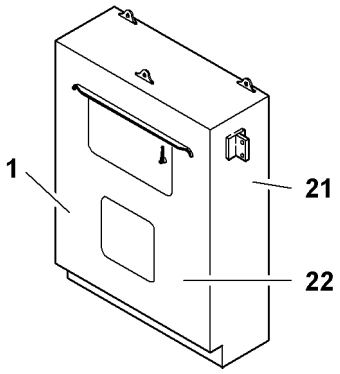
		mm / ft in
L		5,050 / 16'6"
R		971 / 3'2"
S		1,225 / 4'
T		1,065 / 3'5"
U		3,080 / 10'1"
V		5,800 / 19'
OEL	Operator's eye level	4,580 / 15'

Jobs listed as daily / weekly work may be carried out by the machine's driver or maintenance personnel when they have received appropriate instruction.
The remaining work may only be carried out by specialist personnel with appropriate training.

– Replacement parts must correspond to the technical requirements determined by the manufacturer. Original replacement parts are always guaranteed to meet these criteria.
– Always wear safe work clothes when carrying out maintenance work. Avoid the wearing of rings, wrist watches, ties, scarves, open jackets, baggy clothing etc... There is a risk of injury from, for example, getting caught up or being drawn in.
Protective goggles, safety helmets, safety shoes and gloves, reflective vests and ear protection etc. are required for specific jobs.
– Do not remain in direct proximity of the diesel engine while the diesel engine is running.
Persons with pacemakers should not approach within 20 cm of the running diesel engine.
Do not touch voltage-carrying parts on the electrical connection of the individual solenoid injection pumps (Unit Pumps UP) while the diesel engine is running.
– Do not permit unauthorised persons to approach the machine during maintenance work.
– Cordon off a wide maintenance area if required.
– Inform operational personnel before starting to carry out any special work and repair work. Designate persons in charge of supervision.
– In the absence of any other information in the operating instructions, carry out all maintenance work on the machine on level, firm ground with the working equipment set aside and the engine switched off.
– For some machines, the only one position which enables a secured access to every maintenance locations on the uppercarriage, is when the uppercarriage is aligned with the undercarriage so that the sprockets locate at the back-end.
The ladder situated on the undercarriage only corresponds with the uppercarriage’s access when the excavator is in this configuration.
– Pull out the ignition key and shut off the main battery switch.
– Always tighten any loose screw connections during maintenance and repair work.
– The mounting bolts of the main components, of the hydraulic hoses and of the counterweight must be replaced after every removal.
– If safety devices have to be dismantled during set-up, maintenance and repair work, they must be immediately reinstalled and checked at the end of the work.
– When carrying out repair work, particularly when working under the machine, hang a “Do not start” warning sign in a clearly visible position on the control panel. Pull out the start key and shut off the main battery switch.
– Operate combustion motors and fuel operated heaters only in well ventilated areas. Before operating these units, check ventilation.
– In addition, always follow applicable local regulations.

Cleaning

– Clean oil, fuel or care products off the machine before starting maintenance or repair work and pay particular attention to connections and screw fittings.
Do not use aggressive cleaning products and use lint-free cleaning cloths.
– Do not use aggressive cleaning products or steam jet devices to clean the machine for the first two months after initial set-up of the machine (or after repainting).
– Do not use combustible liquids to clean the machine.



1 Low voltage electrical box **S2**

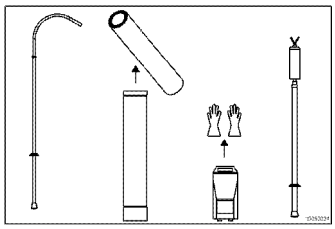


Plate 21: Security kit for high voltage label

Indicates the elements which compose the security kit for high voltage.

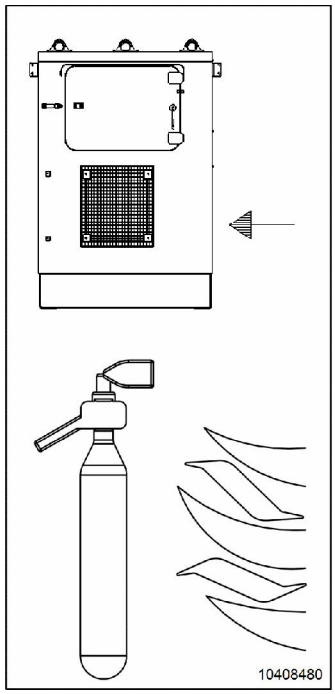
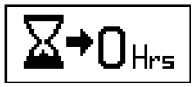
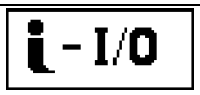
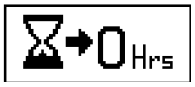


Plate 22: S2 carbon dioxide fire extinguisher label

Indicates to use the provided carbon dioxide fire extinguisher on low voltage box S2 in case of fire.

Symbol	Description
	Reset daily operating hours counter
	Confirm service interval
	Select quantity limitation relating to attachments (eg. hammer)
	Operating hours and device data
	Status of hydraulic pumps and electrical inputs and outputs
	Recorded and stored errors
	Immobilizer (must be activated by LIEBHERR customer service using a service connector)

Tab. 3-1 *Overview of menu options*



Reset daily operating hours counter menu

The daily operating hours counter can be reset to 0 using this menu.

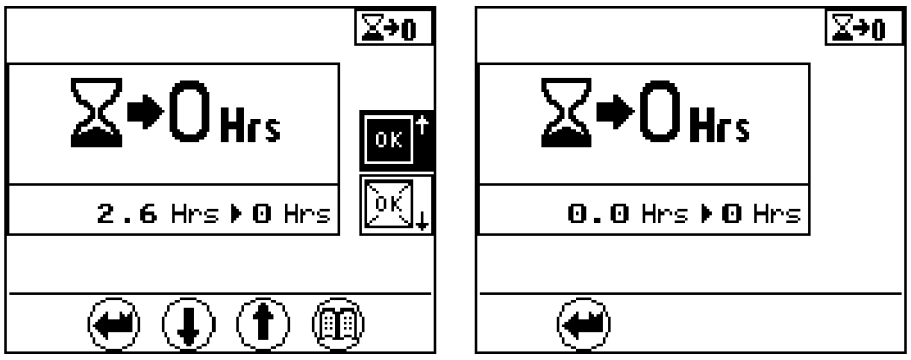


Fig. 3-13 *Resetting the daily operating hours counter*

To set the daily operating hours counter to 0:

▶ Press the **Up** arrow key.
  ↳ The OK which is not crossed out will be displayed with a black background.

▶ Press the **Menu*** button.
  ↳ The operating hours will be reset to 0.
  ↳ The arrow key symbols **Up** and **Down** and the **Menu** symbol will no longer be displayed.

To exit the menu:

▶ Press the **Back** button.
  ↳ The submenu will be aborted.

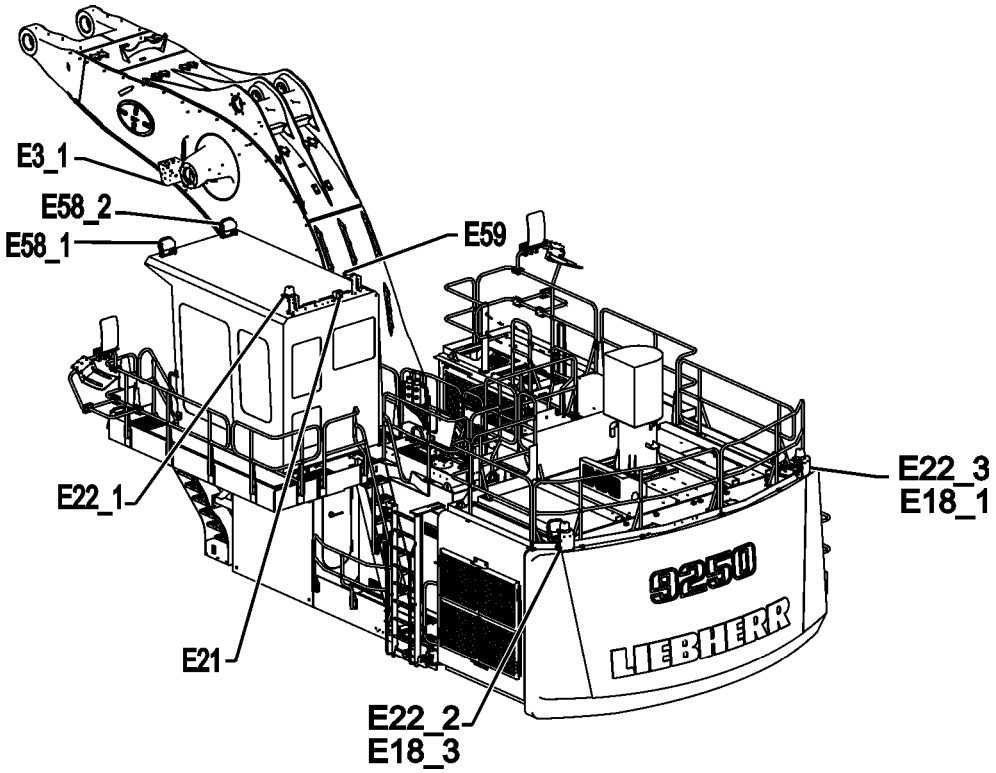


Fig. 3-41 *Arrangement of lighting*

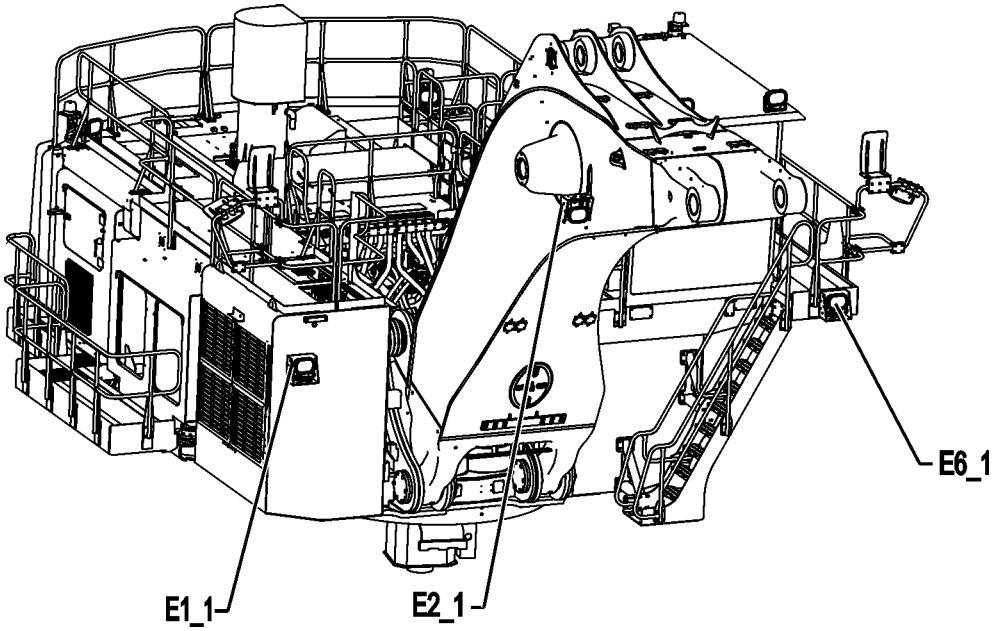


Fig. 3-42 *Arrangement of lighting*

E1_1	Fuel tank floodlight	**E21**	Top of cabin floodlight
E2_1	Attachment floodlight	**E22_1**	Top of cabin floodlight
E3_1	Attachment floodlight	**E22_2**	Counterweight floodlight (option)

- ❑ If the door on **S1** or **S2** is open:
  - ⇘ The electric motor is stopped.
  - ⇘ The indicator light in the button **S210** comes on.

▶ Push the button **S210** to acknowledge the information.

For machine with option «Vessel - excavator data link»

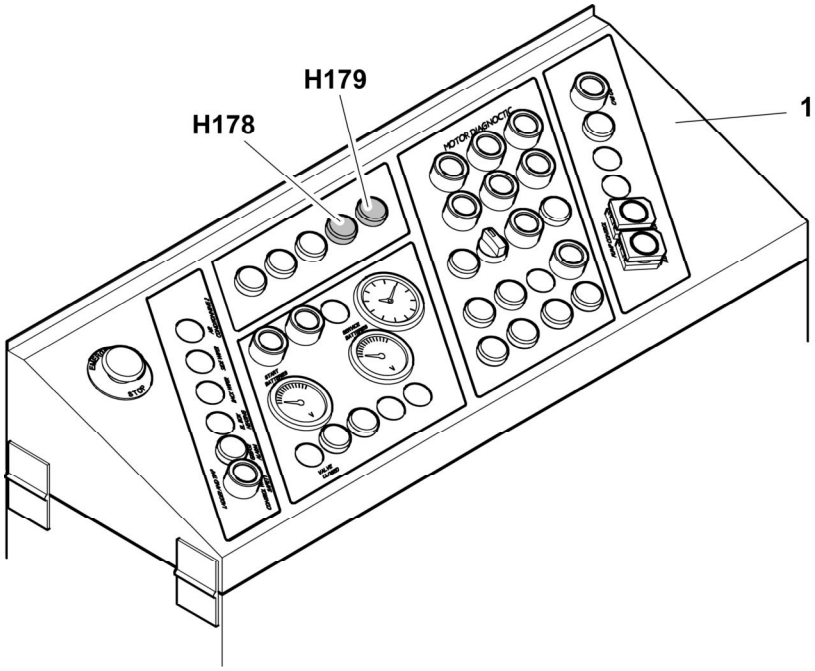


Fig. 3-60 *Control board*

1	Control board
H178	Indicator / Vessel general alarm
H179	Indicator / Emergency trip

Common alarm

- ❑ If a common alarm is detected on the excavator:
  - ⇘ The buzzer sounds in the cabin.
  - ⇘ The machine sends the information «Common alarm» to the vessel.

Remote trip to CB

- ❑ If the excavator detects an important problem (water in high or low electrical box, overvoltage) or if an emergency stop is pushed:
  - ⇘ **H179** comes on.
  - ⇘ The machine sends the information «Remote trip to CB» to the vessel.

GA alarms

- ❑ If a relevant alarm is detected on the vessel:
  - ⇘ **H178** comes on.
  - ⇘ The excavator is not more supplied with electricity.

Emergency power supply for boom cylinders

The boom cylinders can be moved for emergency operations with an auxiliary power

storage.

Note!
The lashing and lifting points are indicated on the concerned elements of the excavator by specific labels (see § "Signs on the machine"). To be easily recognized, lifting points are painted in yellow (in red if excavator is yellow) as well.

Danger!
The lifting points given on a transport drawing for an element are designed to lift this element only and nothing else.

▶ Never lift an assembly of several elements by the lifting points of only one of these elements.

F12_3	25A fuse / working light	F137	8A fuse / Reserve
F12_4	25A fuse / working light	F138	100A fuse / Service circuit supply
F12_5	25A fuse / working light	F139	100A fuse / Engine control system
F12_6	25A fuse / working light	F140	15A fuse radio box
F20_1	100A fuse / supply cabin KI15	F141	15A fuse cigar lighter
F20_2	100A fuse / supply **E1005** KI15	F142	15A fuse service socket
F20_3	100A fuse / charging current	F143	25A fuse service lighting
F20_4	100A fuse / KI30 floodlight	F144	15A fuse ladder control system
F20_5	100A fuse / KI30 counterweight floodlight	F145	Reserve
F20_6	100A fuse / engine	F152	25A fuse / Quantum
F20_7	8A fuse / **E1003**	F164	7,5A fuse / **E1003**
F37	25A fuse / Ether	F166	Reserve
F119	8A fuse / KI30	F167	25A fuse / Foot heating option
F120	50A fuse / air conditioning	F169	15A fuse / Charging
F121	50A fuse / air conditioning	F170	Reserve
F122	15A fuse / optional windshield wiper		

Power connection box **E1003** is located in the cab elevation.

4.3.2 Cabin connection box E1005

All other fuses and relays are on the cabin connection box **E1005**. The cabin connection box **E1005** is located in the cabin, behind the operator's seat.

Danger
Incorrect or bypassed fuses do not offer the machine's operator or the electrical system the required degree of protection.

- ▶ Only use original fuses.
- ▶ Never bypass electrical fuses.

If required, order replacement fuses from Liebherr.

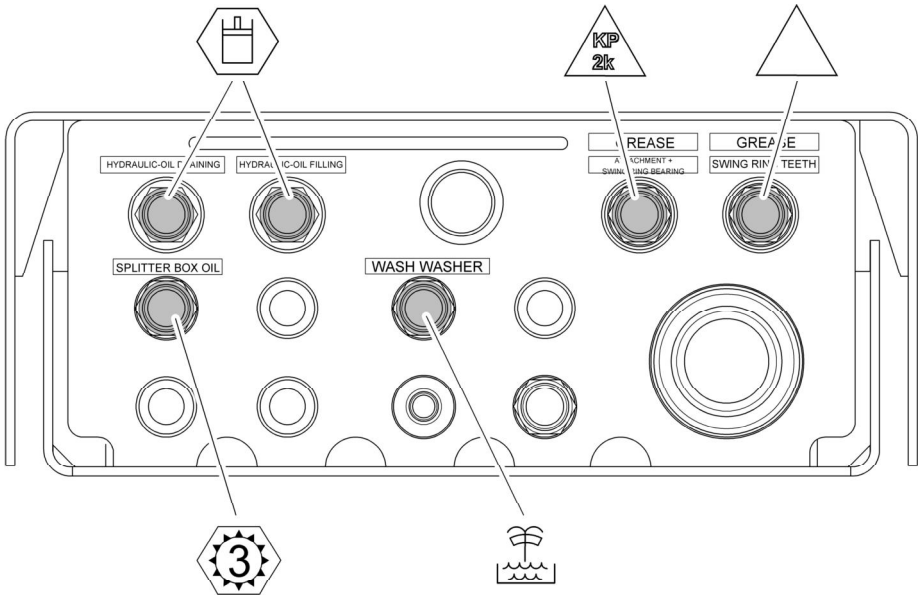


Fig. 5-8 *Service trap hydraulic operated*

5.4.4 Lubricant chart

Designation	Medium	Symbol	Classification	Viscosity	Quantity*
Electric motor	Lubricating grease	M	Refer to the Manual for safety, installation and maintenance of the electric motor manufacturer.		
Hydraulic tank	Hydraulic oil		Refer to section «Lubricating and operating material specifications».		2500 l in hydraulic tank 4050 l in whole circuit
Swing gear	Transmission oil	1	Refer to section «Lubricating and operating material specifications».		2 x 39 L
Splitterbox	Transmission oil	3	API-GL-5 MIL-L 2105 B, C or D	SAE 90 SAE 80W-90	60 L
Swing ring roller bearing races and general lubrication points	Lubricating grease	KP 2K	Refer to section «Lubricating and operating material specifications».		200 kg
Swing ring teeth	Lubricating grease		Refer to section «Lubricating and operating material specifications».		15 L

Swing gear

Component	Parameter	Action level value	Action
Swing gear	Iron level	400 ppm	Change oil (get a sample again after 250 hours).
	Copper level	150 ppm	Change oil (get a sample again after 250 hours).
	Silicon level	15 ppm	Check component for entrance of dust (sealing, breathers...). Flush and change oil (get a sample again after 250 hours).
	Water content	0,10%	Change oil (get a sample again after 250 hours).
	Viscosity change (at 40°C and 100°C)	<15%(*)	Change oil (get a sample again after 250 hours).
	Additives change	±20%(*)	Change oil (get a sample again after 250 hours).

(*) Difference compared to new oil value.

P5.x Swing pump

Bleeding of cooling pump

Depending on the machine, the cooling pump can be different.

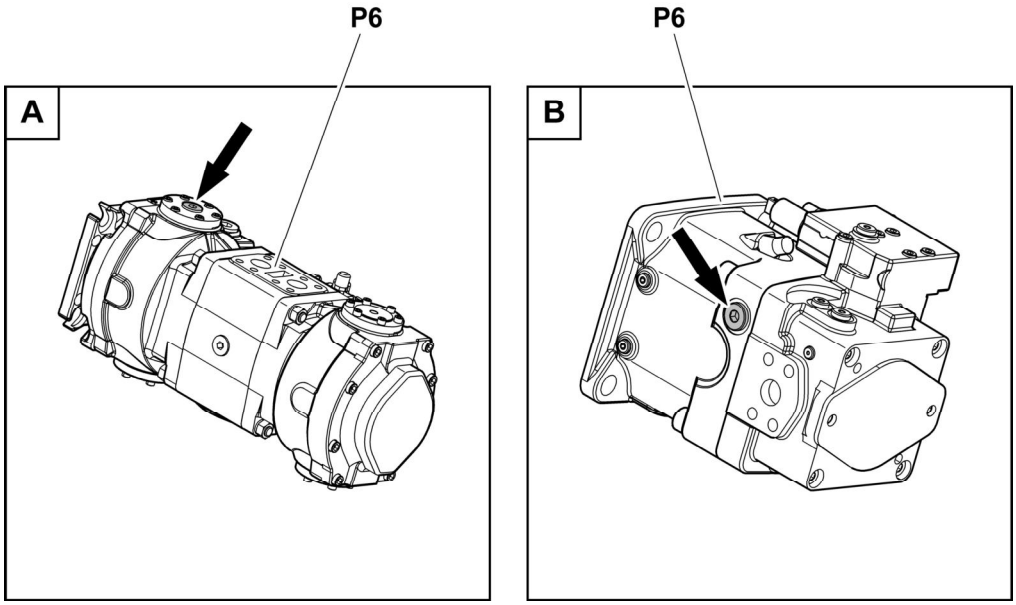


Fig. 5-40 *Bleeding points of the cooling pump*

P6 Cooling pump

5.9.12 Bleeding the hydraulic cylinders

The cylinders must be bled after each cylinder replacement and after work carried out on the cylinders (replacement of seals, etc.) or the hydraulic circuits (replacement of hose, etc.).

- ▶ Start the motor and let it run for the duration of the procedure.
- ▶ If possible, move the attachment to put the side to be bled (**not-supplied side**) in the upper position.
- ▶ Slowly extend the cylinder to the extreme position and then slowly fully retract it again. Make sure that all movements are slow and smooth. Do this process a minimum of 5 minutes.

Danger!
If the cylinder is not correctly bled, gas bubbles can form in the system (mixture of air and hydrocarbon). At high operating pressures in the cylinder, these gases can explode (Diesel effect).

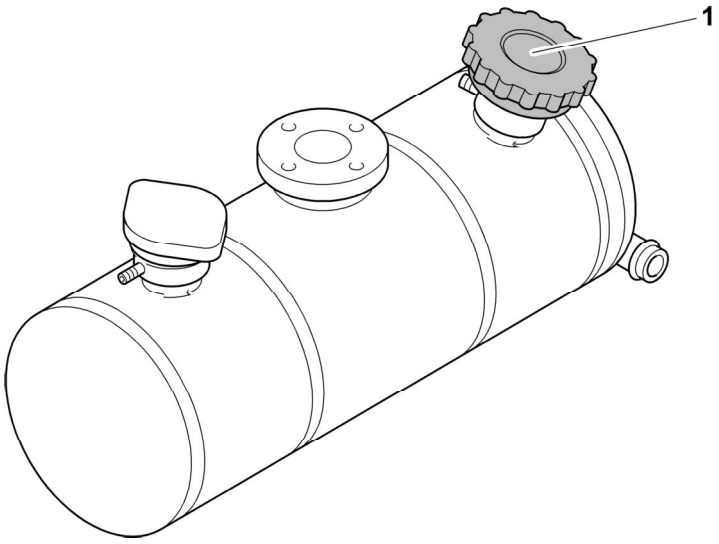


Fig. 5-56 *Container for heater coolant mixture*

Fill the container with coolant mixture:

- ▶ Remove the filler cap **1** to add coolant mixture.
- ▶ For coolant mixture specifications and quantity, refer to section «Operating material chart».

The heating system has also a preheating unit installed in the cab elevation which makes the coolant mixture warm.

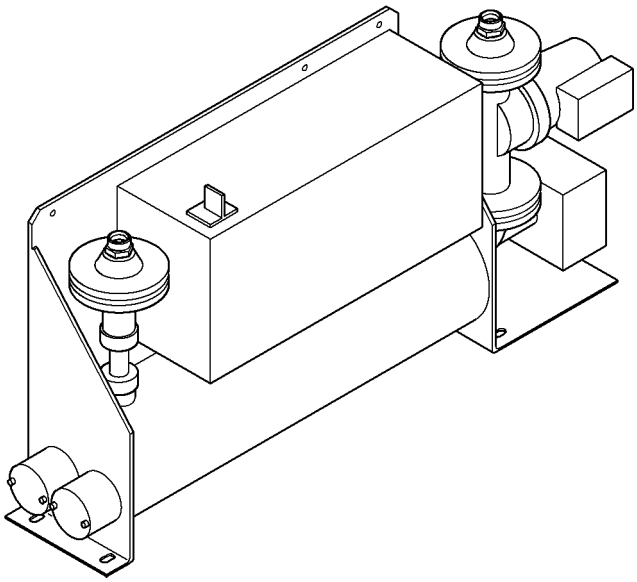


Fig. 5-57 *Preheating unit for heater coolant mixture*

No maintenance is necessary for the preheating unit.

- ▶ But if the heating system is stopped for a long time, make sure that the preheating unit (with pump) stays always filled with coolant mixture or preservative fluid.

WORK TO BE PERFORMED AT 250, 750, 1250 HOURS, ... Check ❑ for first and only interval *or* Check ❍ for repeat interval	Check	Initials	Comments
START THE MOTOR TO CHECK THE FOLLOWING ACTIONS			
General: Maintenance work must include the check of the correct functions of hydraulic and electric systems before starting operation	❍		
Attachment: Check function of the working attachment lubrication system during operation	❍		
Attachment: Check if the damping system on equipment is working correctly	❍		
Uppercarriage: Check position of the hydraulic shut-off valve	❍		
Swing Gear: Check function and operation of the swing brake	❍		
Swing Ring: Check function of the swing ring bearing lubrication system during operation	❍		
Swing Ring: Check function of the swing ring teeth lubrication system 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	❍		

6.1.2 General information

Components description

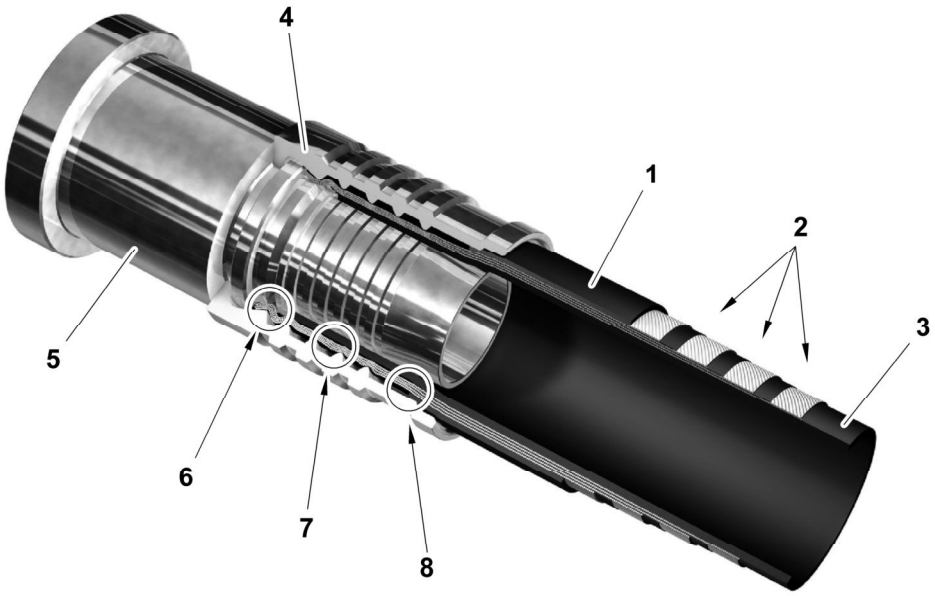


Fig. 6-1 *Hydraulic tube and hose assembly*

1	Rubber cover	**5**	Nipple
2	Reinforcement layer	**6**	Nipple wire trap area
3	Inside rubber tube	**7**	Sealing zone
4	Crimp fitting	**8**	Damping zone

For this document, the terms that follow are available:

– A **hose** is a hydraulic tube. It is made by:
  • the rubber cover **1**
  • the reinforcement layer **2**
  • the inside rubber tube **3**
– A **hose assembly** is a hose with fittings attached at the two ends. The fittings are made by:
  • the crimp fitting **4**
  • the nipple **5**

Marking of the components

The hose and the hose assembly are marked with the general data given below.

Hose marking

The hose is marked on the rubber cover with:

– the nominal diameter (DN)
– the manufacturer identification
– the date of production "xQxx" of the hose (i.e. 2Q13 = second quarter of 2013)
– the hose type and quality

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
o 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

5.1 Filling of the reservoir

WARNING

Risk of hand injuries caused by the stirring paddle or shovel foot

- Fill lubricant via the lid only when pump is idle. Never reach into the reservoir or grease barrel while the pump is running.

- Observe extreme cleanliness when topping up the grease reservoirs.
- Contaminated lubricant causes malfunctions and premature wear of the grease pump and other components of the system.
- Clean surroundings before exchanging or topping up
- Switch off centralized lubrication system

Filling of the container through service-plate

- Remove dust protective cap at the filling coupling and the dust protective cap at the filling nipple
- Couple the filling hose for P1 resp. P2 and switch on the filling pump
- When the reservoir is full, the sensor transmits an electric signal to the control unit. Visual control is possible by using the dipstick
- When the filling pump is switched off
  Disconnect the filling coupling and reinstall the dust protective caps

5.2 Inadvertent filling with incorrect lubricant

Should incorrect lubricant have been filled, please proceed as follows:

- Switch off the pump or centralized lubrication system and secure it against being switched on.
- Remove lubricant.
- Clean the entire centralized lubrication system (lubricant reservoir, pump housing, metering devices and line systems).
- Fill in lubricant of correct specification.
- Switch the system or pump on.
- Vent lubrication system.
- Inform your superior to ensure that the error won't occur again.

5.3 Inspections prior to initial start-up

ATTENTION

Risk of damage to the machine

Fill the feed lines and bearing housings with lubricant to specification and lubricate the lubrication points by hand. Otherwise the bearing points may become damaged due to a lack of lubricant.

Check the entire system for accordance with the intended purpose and the planning documentation. Ensure that all parameters, characteristic values and means of operation are present and have been correctly adjusted. If deviations are detected, they must be remedied without delay.

9.3 System P3: Swing ring and swing gear lubrication

In the automatic system P3, the central lubrication pump provides lubricant to the Progressive Metering Device (Progressive System) which distributes the lubricant to each lubrication point evenly (swing ring teeth and the swing gear centering seat).

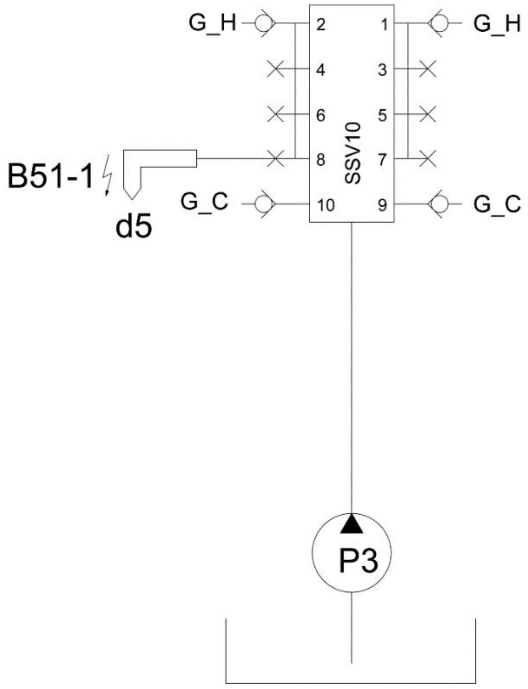


Fig. 6 Schematic of lubrication: Swing ring teeth and swing box centering

Grease cycle

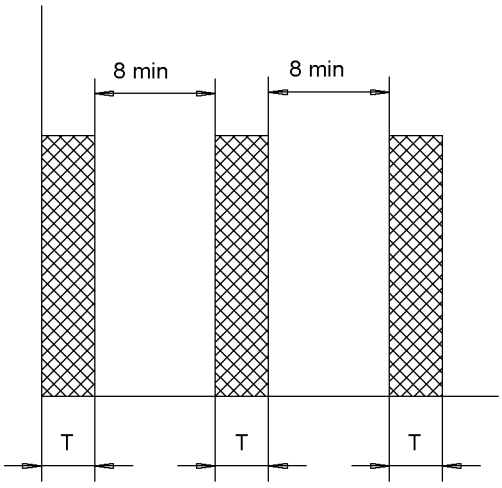


Fig. 7 Grease cycle

When the pause time has lapsed, the pump P3 supplies lubricant to the connected progressive metering device. A progressive metering device type SSV 6 is provided with the proximity switch B51 for control and monitoring purposes. After two cycles of the SSV 6, which correspond to a full lubrication cycle, the pump P3 is switched off thanks to the proximity switch B51.

Conversion factors

Pressure:	1	bar	= 14.5	PSI
	1	PSI	= 0.0690	bar
Length:	1	mm	= 0.03937	inch
	1	cm	= 0.3937	inch
	1	m	= 39.37	inch
	1	inch	= 25.40	mm
	1	foot	= 0.3048	m
Volume:	1	liter	= 0.2642	US gallon
	1	liter	= 2.113	pint
	1	liter	= 1.057	quart
	1	US gallon	= 3.785	liter
	1	cm^3	= 0.06102	cubic inch
	1	m^3	= 1.3079	cubic yard
Torque:	1	Kpm	= 7.23	ft.lbs
	1	Nm	= 0.7375	ft.lbs
	1	ft.lbs	= 0.138	Kpm
	1	ft.lbs	= 1.358	Nm
Weight:	1	kg	= 2.2046	lbs
	1	metric ton	= 1.102	short ton
	1	metric ton	= 2204.6	lbs
	1	lbs	= 0.4536	kg
	1	lbs	= 0.000454	metric ton
Temperature:		Temp (°F)	= Temp (°C) x 1.8 + 32	
		Temp (°C)	= [Temp(°F) - 32] / 1.8	
	0	°C	= 32	°F
	100	°C	= 212	°F

Representation	No.	Description	Size	Order No.	Model									Application
					R9100	R984C	R9150	R994	R9250	R994B R9350 R9400	R995	R996 R996B	R9800	
	390	DDC software DDDL		10337988							X			
	400	Connecting wire A		7373124							X			Connect to engine
	410	Connecting wire B		10007873							X			Between wire A and box

Representation	No.	Description	Size	Order No.	Model									Application
					R9100	R984C	R9150	R994	R9250	R994B R9350 R9400	R995	R996 R996B	R9800	
	773	Lifting device for control valves bracket		11076478	X									

Representation	No.	Description	Size	Order No.	Model									Application
					R9100	R984C	R9150	R994	R9250	R994B R9350 R9400	R995	R996 R996B	R9800	
	1050	Extraction tool to push a crimped contact of the MATE-N-LOK connectors		7366655	X	X	X							
		Extraction tool to remove contacts of connectors DEUTSCH Size Wire range												
	1060		20	8503630	X	X	X	X	X	X	X	X	X	
	1061		16 (thin wall wire seal)	8145673	X	X	X	X	X	X	X	X	X	
	1062		16	8503631	X	X	X	X	X	X	X	X	X	
	1063		12	8145674	X	X	X	X	X	X	X	X	X	
	1064		8	8503632	X	X	X	X	X	X	X	X	X	
	1065		4	8503633	X	X	X	X	X	X	X	X	X	

2.2.2 Production number

Each motor is also identified by a production number stamped on the nameplate. This number is formed by 9 characters (example: 06A281-001).

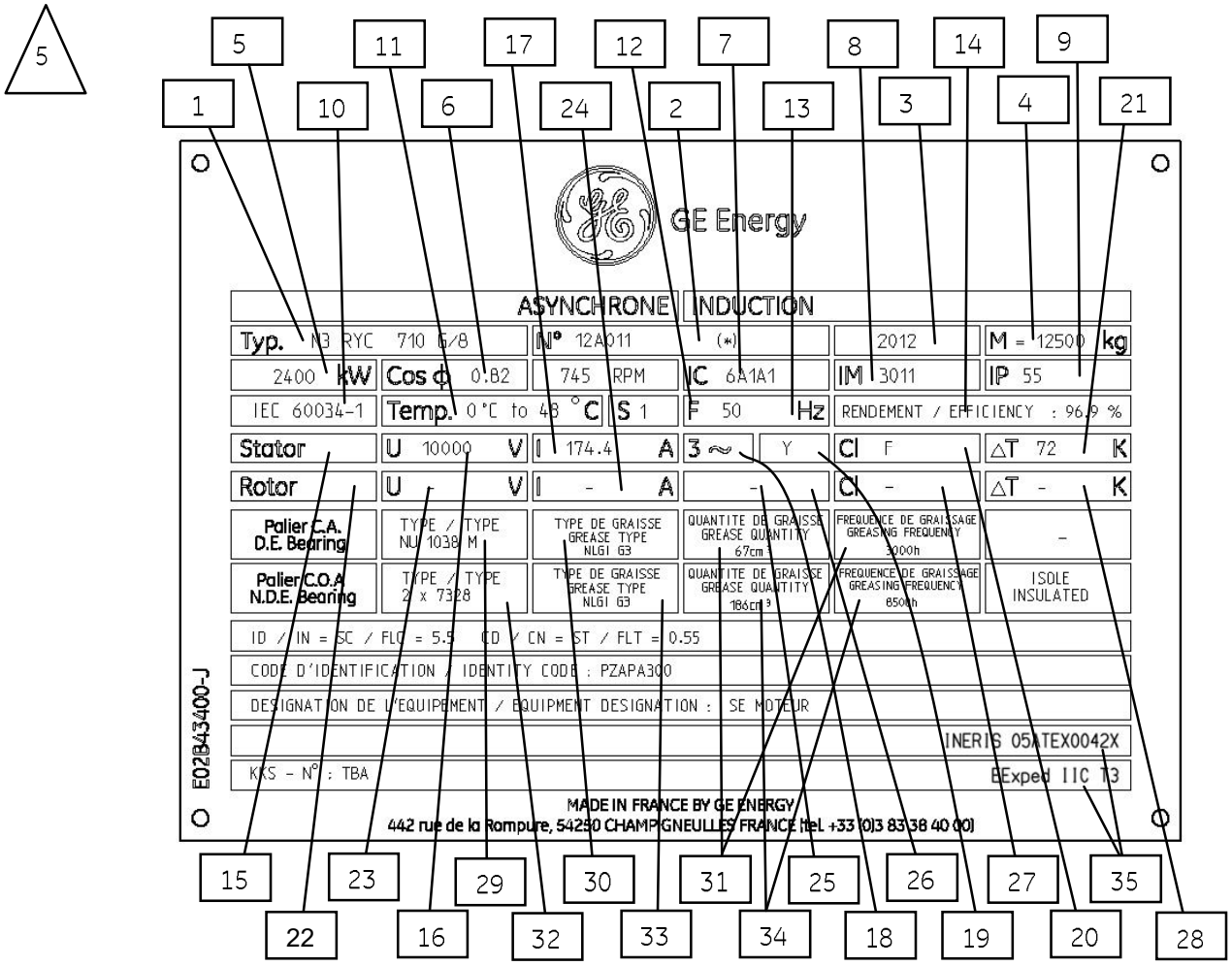
- The first 6 characters designate the internal order number.
- The last 3 digits represent the motor number of the series.

This number must be indicated in all correspondence with Power Conversion for any questions concerning the machine.

2.2.3 Nameplates

The essential information concerning the motor is referenced and identified by nameplates.

2.2.3.1 Machine nameplate



4.3.3 Check of shaft line - alignment

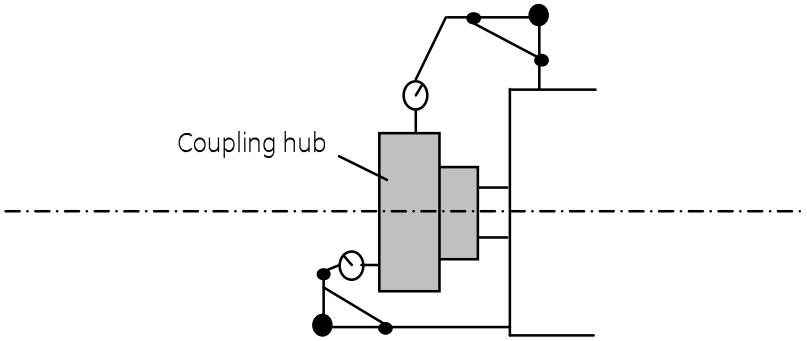
4.3.3.1 General information concerning adjustment of machine

The shafts and sleeves used as reference for the alignment must have a run-out of less than 3/100 mm.

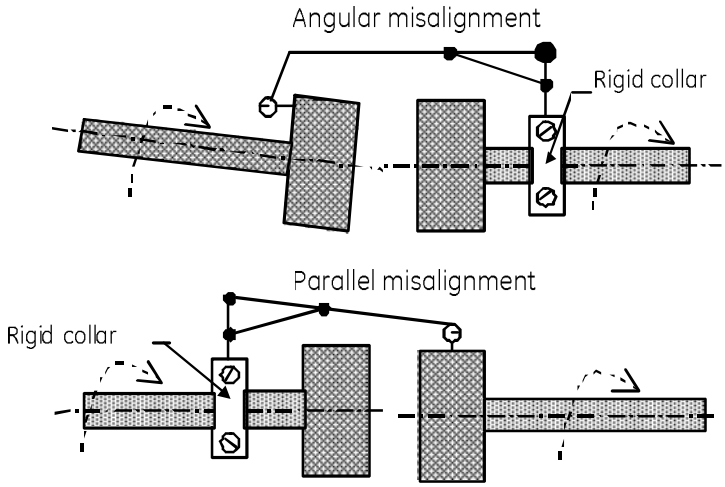
Measuring coupling hub run-out:

The coupling hub run-out is measured to detect possible defects of the shaft-coupling hub system.

This measurement is performed using dial gauges to take a measurement with respect to the machine bearing, positioned as shown in the figure below.



It is necessary to adjust the parallelism (angular misalignment) and the concentricity (parallel misalignment) of the coupling sleeves of the drive and driven machines. Jack screws and adjusting shims supplied with the motor are used for this purpose. The alignment can be performed using a system of dial gauges as described below, or using a laser system.



The machine must be adjusted using a system for fine adjustment (longitudinal and transverse) of the jack or adjustment screw.

For the vertical direction, threaded holes and jack screws are provided on the motor legs for adjustment.

6. OPERATION

6.1 GENERAL RECOMMENDATIONS

The motor operating parameters during operation must be monitored regularly to ensure the integrity of the motor with respect to various disturbances which may affect the motor.

The parameters monitored should be recorded regularly to ensure the contractual utilisation conditions and to detect the source of any possible malfunction.

This database will form a useful source of information for possible future corrective maintenance operations which may be required.

Where any overshoot of the operating thresholds be observed relative to the contractual operating conditions, the motor should be shut down immediately to prevent a minor deviation from becoming a major source of damage to the motor.

If any special problems are encountered, contact the Power Conversion Service department for assistance in solving the problem encountered.

6.2 SPECIAL OPERATING CONDITIONS

All Power Conversion motors are designed for operation consistent with the contractual specifications and the CEI or NEMA standards relative to the operating modes.

Refer to the technical data sheet of the motor to check that the special operating conditions effectively correspond to the design of the motor ordered.

6.2.1 Monitoring

Operation of the motor must be monitored regularly by skilled and qualified technicians to ensure the required operating conditions.

As part of monitoring, the operating parameters of the motors as defined in the installation report must be periodically recorded in the report given in **paragraph *"1. Safety instructions"*** of this manual.

During the first two weeks of operation, the operating parameters must be monitored continuously.

Then, once the motor is in a stable and steady operating state, periodic entry of the parameter readings taken will suffice.

All the readings must be entered in a monitoring record; these readings will be useful not only to the user, but also to the manufacturer should an intervention be required.

Diagnostics

The bias index and insulation measurement values should be logged in accordance with the frequency of the first level maintenance operations.

This history of bias index variations is highly significant as concerns pollution of the coils and premature aging of the insulation.

A significant reduction in bias index generally reflects pollution of the coil insulation by humidity, or possibly dust. Where this is the case, the coils should be dried or cleaned to reduce the insulation deterioration factors.

If the insulation reconditioning operations produce a bias index value near to that registered during the previous maintenance operation, this situation will not point to significant damage of the winding.

In the opposite case, attention should be given to the causes and consequences of the damaged insulation. A chart showing the evolution of the bias index will allow you to estimate the significance of the aging, and the need to plan, in the near future, replacement of the considered winding.

Coil cleaning recommendations

If necessary, the coils should be cleaned using non-flammable solvents and varnishes appropriate to the winding resin. This type of cleaning must only be performed by qualified personnel due to the dangerous substances handled and the tests to be performed at high voltages.

During the warranty period, this type of cleaning, required by the operating conditions on site, can only be performed by personnel qualified by Power Conversion. When such cleaning becomes necessary, you should contact the Power Conversion service department (see **paragraph "8.*1 Presentation of Service department and contact details*"**).

7.2.3.5 Maintenance of brush and ring system

The ring-brush system should be monitored regularly to avoid any functional drift due to the natural wear of the ring-brush system.

Incorrect maintenance of the rings and brush-holders can result in sparking, leading to complete damage of the system.

The out-of-round and irregular deformation of the surface of the rings should therefore be regularly monitored in order to correct any drifts observed.

For any out-of-round greater than 0.03 mm, the rings should be ground.

If excess wear is observed, the ring system should be replaced.

The positioning of the brush holder system must be systematically checked to ensure proper alignment and engagement of the brushes with respect to the rings. An alignment defect can sometimes be due to incorrect mounting of the motor coupling. Furthermore, the perpendicularity of the brush with respect to the ring should be checked to avoid any premature damage of the brushes.

The insulation surface of the brush holders should be cleaned of the carbon dust which inherently occurs due to the wear of the brushes to avoid the risk of electrical discharges. This residual dust should be eliminated by vacuuming.

1 – ELECTRICAL CHECKS

Check points	Action achieved		Date	Conform	Not conform	Controller visa
	Expected values	Measured values				
1.1. MEASUREMENT OF INSULATION REISITOR (before start-up)						
Stator winding	Value: ..... Mohm (2500 V during 1 minute)	Value: ..... Mohm (2500 V during 1 minute)				
Rotor winding (if applicable)	Value: ..... Mohm (1000 V during 1 minute)	Value: ..... Mohm (1000 V during 1 minute)				
Insulation value of the space heater	Value: ..... Mohm (500 Vcc during 45 sec)	Value: ..... Mohm (500 Vcc during 45 sec)				
Insulation value of the thermal probes resistance	Value: ..... Mohm (500 Vcc during 45 sec)	Value: ..... Mohm (500 Vcc during 45 sec)				
Value in case of two insulated bearings	Value: ..... Mohm (45 VCC during 45 sec)	Value: ..... Mohm (45 VCC during 45 sec)				
1.2. VALUE OF POLARIZATION INDEX (before start-up)						
IP = R10 min / R1 min		Value :				
1.3. MEASUREMENT OF THE INSTRUMENTATION RESISTANCE (before start-up)						
Platinium thermal probes 100 ohms at 0°C stator	Values: 1 : ..... ; 2: ..... ; 3: ..... ; 4: ..... ; 5: ..... ; 6: ..... ; 7: ..... ; 8: ..... ohms	Values: 1: ..... ; 2: ..... ; 3: ..... ; 4: ..... ; 5: ..... ; 6: ..... ; 7: ..... ; 8: ..... ohms				
Platinium thermal probes 100 ohms at 0°C bearing	DE/NDE: ..... / ..... ohms	DE/NDE: ..... / ..... ohms				
Platinium thermal probes 100 ohms at 0°C air	Input/Output: ..... / ..... ohms	Input/Output: ..... / ..... ohms				
Space heater	..... ohms	..... ohms				
1.4. ELECTRIC NETWORK						
Voltage variation on the network	..... - ..... Volts	..... - ..... Volts				
Frequency variation on the network	..... - ..... Hz	..... - ..... Hz				
1.5. CONNECTIONS						
Space heaters					Introduced correction:	
Brushes					Introduced correction:	
Protection devices					Introduced correction:	
Phases and/or neutral					Introduced correction:	
Tightening torque of the HV supply cables – Type de connections:	Tightening torque: .... N.m	Tightening torque applied: .... N.m				
1.6. ADJUSTEMENTS OF THE PROTECTION DEVICE						
Probes of the stator windings	Alarm threshold: ..... °C	Alarm threshold: ..... °C				
	Trip threshold: ..... °C	Trip threshold: ..... °C				
Bearing probes	Alarm threshold: ..... °C	Alarm threshold: ..... °C				
	Trip threshold: ..... °C	Trip threshold: ..... °C				
Air input probe	Alarm threshold: ..... °C	Alarm threshold: ..... °C				
	Trip threshold: ..... °C	Trip threshold: ..... °C				
Air output probe	Alarm threshold: ..... °C	Alarm threshold: ..... °C				
	Trip threshold: ..... °C	Trip threshold: ..... °C				
Other:	Alarm threshold: ..... °C	Alarm threshold: ..... °C				
	Trip threshold: ..... °C	Trip threshold: ..... °C				
Maximum voltage		Carried out adjustments:				
	Alarm:	Alarm:				
	Motor stop:	Motor stop:				
Minimum voltage		Carried out adjustments:				
	Alarm:	Alarm:				
	Motor stop:	Motor stop:				
Unbalance		Carried out adjustments:				
	Alarm:	Alarm:				
	Motor stop:	Motor stop :				
Maximum current		Carried out adjustments :				
	Alarm:	Alarm :				
	Motor stop:	Motor stop:				
Overload		Carried out adjustments :				
	Alarm:	Alarm:				
	Motor stop:	Motor stop:				
Differential protection		Carried out adjustments:				
	Alarm:	Alarm:				
	Motor stop:	Motor stop:				
Differential protection block (transformer protection)		Carried out adjustments:				
	Motor stop:	Motor stop:				

3.1.5 Pressurization system (if exists)

The pressurization system could be stored in a cold temperature but no lower than -50°C if the following conditions are respected:

- The pressurization system is weather protected from direct climate conditions. No moisture can enter the pressurization system housing during the storage period.
- The pressurization system is not subjected to cyclic thermal loads.
- It is not connected to a compressed air supply during cold storage.
- It is not subjected to rough handling or transport that may cause components to crack while cold (the force applied does not to exceed 1G).

3.2 ANTI-VIBRATION AND MECHANICAL PROTECTION

- Protect the shaft end with a steal cover, fitted inside with neoprene rubber.
- Fix to the end of the shaft a locking tool link to the bearing flange with threaded rods + bolts.
- Place the motor on stringers made of restricted hygrometry wood (class C22 plate with class 3 pressure-sealed treatment), having a minimum length equal to the frame plugs. This allows the air to circulate under the frame.
- Insert between wood stringers and the motor plugs, buffers pads Grypsol type, to reduce residual vibration from the ground.

3.3 ANTI-CONDENSATION PROTECTION

Power the heating resistors permanently, except in the particular case of a drained bearing, fitted with a heater working only when completely dive in the oil.

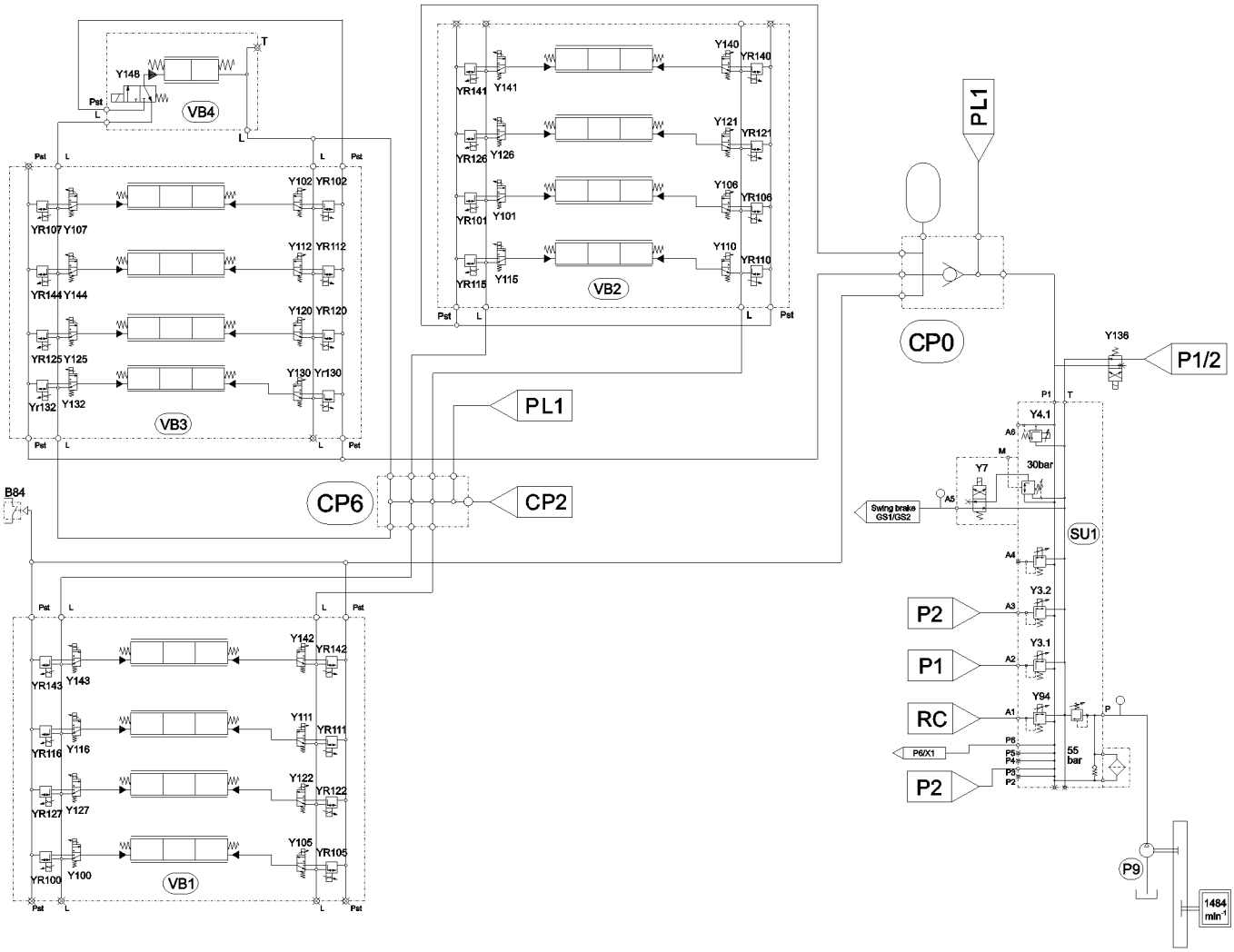
3.3.2 Servo oil circuit

Technical data

Control oil pump **P9**		
Nominal RPM	min^{-1}	2820
Pump delivery max	cm^3	22,5

The servo pressure is used for:
- spool valves movements,
- centralised lubrication,
- swing control,
- pressureless falling for boom,
- swing brake,
- regulation of the working pumps.

Schematic servo oil circuit



B84	Pressure switch / servo control	**Y110**	Solenoid valve crowd extend 1
CP0	Collecting pipe servo oil	**YR110**	Adjustment solenoid valve crowd extend 1
CP2	Lower collecting pipe support control valves	**Y111**	Solenoid valve crowd extend 2

The regulator **LR** is pushed to the left by the force F_{LR}.

$F_{LR} = F_{spring} + F_{XLR}$ F_{spring}: force of the springs

F_{XLR}: force of the pressure **XLR** applied on the piston **LR** surface

The other side of the regulator is held with a pin maintained by a lever **4.1**. The force **F2** is applied to this lever via the position feedback **3.1**.

F2 = **P***$S_{3.1}$ working pressure **P** applied on $S_{3.1}$: surface of the position feedback piston **3.1**.

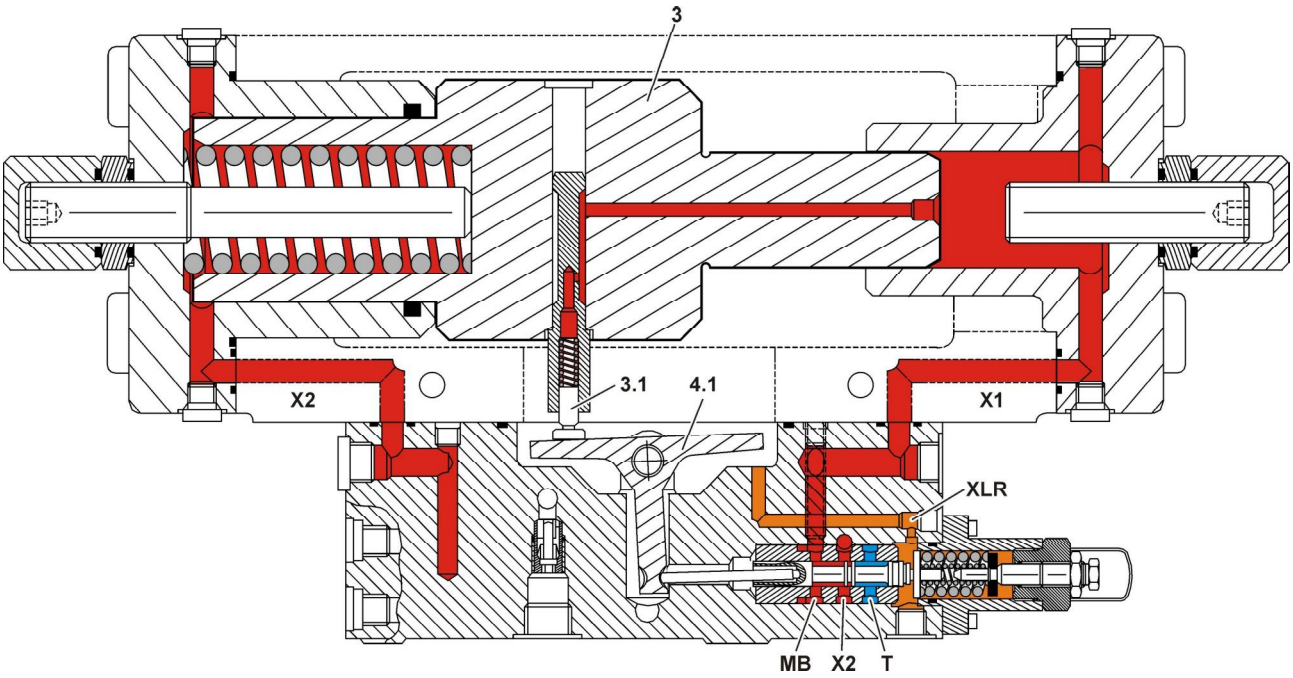
The force **F1** that pushes the regulator piston **LR** to the right is proportional with the force **F2** and with the position of the positioning piston (i.e. with the pump angle). At regulation, the piston **LR** is just balanced with the force **FLR** and the force **F1**.

F1 = F_{LR} = cste and **F1*****d** = **F2*****a**

F1 and **d** are constant, so we have: **F2*****a** = cste and **F2** = **P***$S_{3.1}$

P*$S_{3.1}$***a** = cste **P*****a** = cste (while $S_{3.1}$ = cste)

So if **P** increases, **a** decreases (the pump swivels to minimum angle until a new equilibrium is established).



Once this force (**F1**) exceeds the set preload value of the spring and the force of the **XLR** pressure, the piston **LR** moves to the right and the port **X2** becomes the high pressure.

The positioning piston is than moved to the right (away from **Qmax**) and is displaced so to reduce the pump angle until a new equilibrium between the position of the positioning piston and the pump high pressure is established.

(5×2 + 3,5×1)/2 = 6,75 mm / min.

The maximum permissible retraction speed of the cylinders is then:

(10,5×2 + 7,4×1)/2 = 14,2 mm / min.

The speed of the extending or retracting cylinder depends on the oil quantity and surface area. It works in reverse to the force, i.e., it is faster when retracting the cylinder than when extending the cylinder.

The Liebherr hydraulic cylinders differ in the required stroke, diameter and damper system.

We use cushioned and non-cushioned hydraulic cylinders in our excavators.

The non-cushioned hydraulic cylinders are used mainly for outriggers and for certain (little used) attachment cylinder (as grapples and cylinders for street travel). These cylinders are also mounted on the excavators equipped with proximity transmitters. These excavators reduce automatically the oil flow coming to the cylinders when they reach their end stroke (see also logic system).

On single cushioned cylinders (when extending the piston rod) the cushioning sleeve **9** moves shortly before the piston **12** stops on the piston rod bearing **13**, into the piston rod bearing and reduces the diameter. This greatly reduces the extension speed, see also description of function.

8.3.3 Function of hydraulic cylinder

To extend piston rod 8

The hydraulic oil from the control valves flows to the bottom side of cylinder **10** and actuates piston **12**. The piston rod extends and displaces the hydraulic oil in the piston rod side via control valve to the tank.

With single cushioned cylinders: shortly before the end of the stroke, the cushioning sleeve **9** moves into the cushioning bore on piston rod bearing **13**. When cushioning sleeve **9** moves into the bore, the diameter is reduced, i.e. the oil returns from the hydraulic cylinder to the control valve via grooves in the sleeve **9**. Because of this restriction of return oil, the piston rod movement is slowed down and cushioned.

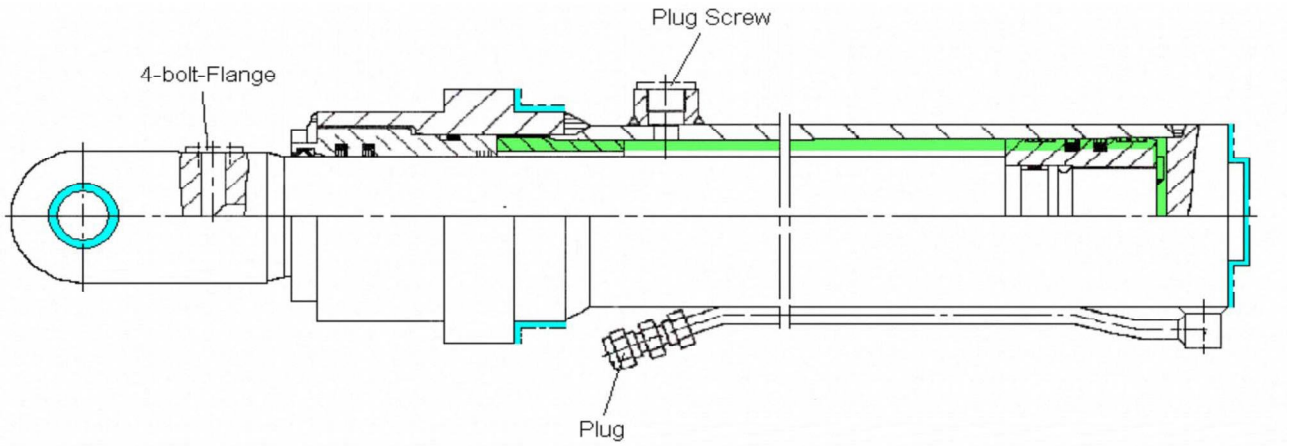
To retract the piston rod 8

The hydraulic oil from the control valves flows to the piston rod side of cylinder **10** and actuates piston **12**. The piston rod retracts and displaces the hydraulic oil on the piston bottom side via the control valves to the tank.

With single cushioned cylinders: the hydraulic oil from the control valve flows to piston rod bearing **13**, pushes on the cushioning sleeve **9** and, via the clearance between cushioning sleeve **9** and piston rod **8**, radial bore holes and grooves in the cushioning sleeve, on piston **12**.

The piston rod retracts and displaces the hydraulic oil on the piston bottom side via the control valves to the tank.

8.3.4 General maintenance



8.7 Secondary valve: 2-stage pilot operated pres. limiting valve

The basic function and working principle of a two-stage secondary relief valve is the same as the secondary relief valve.

A second stage, hydraulic controlled via pressure port is added to the standard relief valve in order to obtain a reduced hydraulic system pressure for certain functions (two stage relief valve).

For use and function of pilot controlled pressure relief valve **9**, refer to subgroup primary relief valve.

8.7.1 Function of pressure cut off

Stage 2 (normal pressure = high pressure)

At this position, no servo pressure is applied to connection **Pst** and the working surface of control piston **11** is at tank pressure via the bore "**a**".

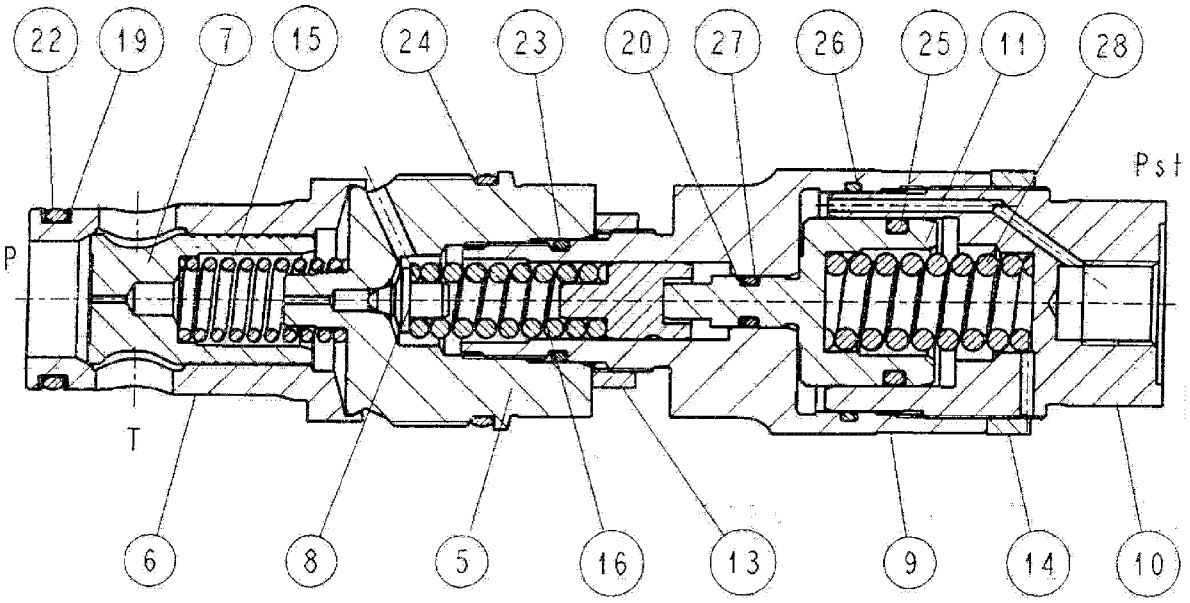
The force of spring **28** pushes the piston **11** to the left.

In this position, the pretension of spring **16** is maximal and so is the relief pressure.

Cut off stage or stage 1 (low pressure)

Servo pressure can be applied to connection "**Pst**". It depends on specific application.

The pressure **Pst** builds up on working surface of control piston **11**, which is pushed against the spring **28**, this decreasing the pretension of the springs **16** and thus the relief pressure.



Pressure check and adjustment

To know how to measure pressure in circuit of relief valve, refer to section «Adjustment».

To check and adjust high pressure (stage 2):

- ▶ Make sure that connection "**Pst**" is at tank pressure (otherwise you could screw the adjustment screw **10** in all ways to the stop).
- ▶ Unlock the nut **13**.
- ▶ Turning adjustment screw **9** clockwise increases the relief pressure - stage 2.
  ③ One turn = 150 bar.
- ▶ Turning adjustment screw **9** counterclockwise decreases the relief pressure - stage 2.
  ③ One turn = 150 bar.

3 Location of the components

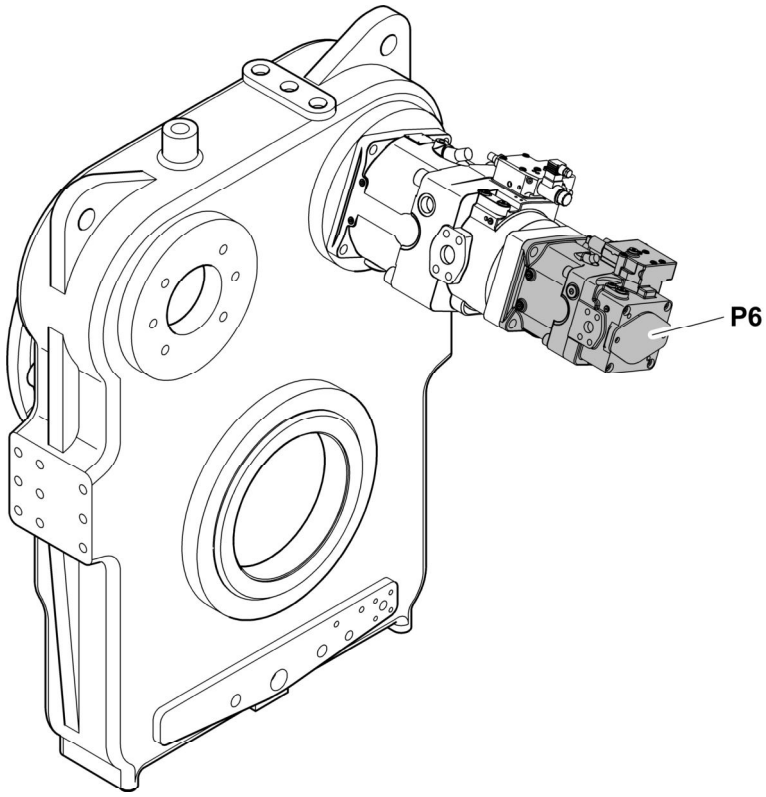


Fig. 1 *Oil cooling pump*

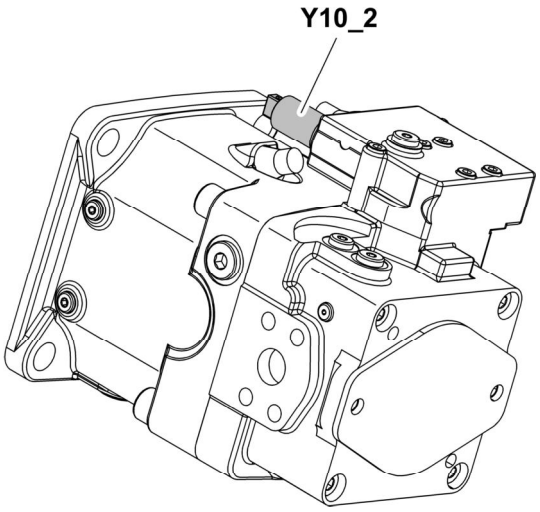


Fig. 2 *Regulation solenoid valve **Y10_2** on **P6***

4.2 Maintenance and repairs

Before carrying out maintenance or repair work, switch off the pump and protect it so that it cannot be restarted inadvertently.
Open the couplings to relieve the system from pressure.
Repair work may only be carried out by qualified personnel using original spare parts.

Check the equipment regularly and repair or replace worn or damaged parts immediately.

If overpressurizing of the equipment is believed to have occurred, contact the authorized service center immediately for inspection of the pump.

Specialized tools and knowledge is required for repair of this pump. Contact the service center nearest you for adjustments other than maintenance specified in this manual.
It is recommended to have the pump serviced once a year.
A list of authorized service centers is available upon request.

Damaged pumps
If a pump is damaged or badly worn or operates abnormally, it must be shut down until it is repaired. Contact the authorized service center for repair.

Repairs
The repairs are limited to the replacement of the listed spare parts. Any other repair requires specialized knowledge and tools. Please contact LINCOLN Walldorf to obtain the name of your nearest repair shop. When ordering spare parts, please indicate the part number, part designation, type number and series letter.

4.2.1 Disassembly of pump

4.2.2 Assembly of pump

4.3 Troubleshooting

5 Spare parts drawing

Spare parts list

See the enclosed Data Sheet 7.5A-18100-J03

Owner Manual
Technical Description

2.1A-30001-F03

QUICKLUB®

Pump Model 203

10011327

Maintenance, Repair and Tests, continuation

Replace pump element

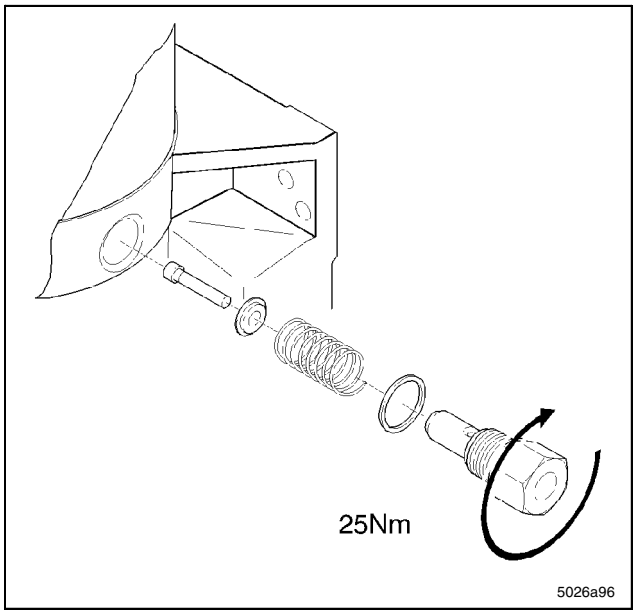


Fig. 24 Replacing the pump elememt

- ➲ Remove the pressure relief valve from the pump element
- ➲ Unscrew the pump element. Take care that the piston, the pull-back spring and the washer are not left lying in the grease, otherwise the reservoir must be disassembled in order to remove these pieces


6001a02

IMPORTANT

Do not leave the piston, spring and washer in the housing because they may block the motor.

- ➲ Install a new pump element and a new sealing ring.


6001a02

NOTE

Pump element with adjustable lubricant output is set to the same output as the old pump element.

Tests

Operational Test / Triggering an Additional Lubrication Cycle

- To check the pump operation it is possible to perform an additional test. Refer to the Technical Description of the respective printed circuit board.

To Check the Safety Valve

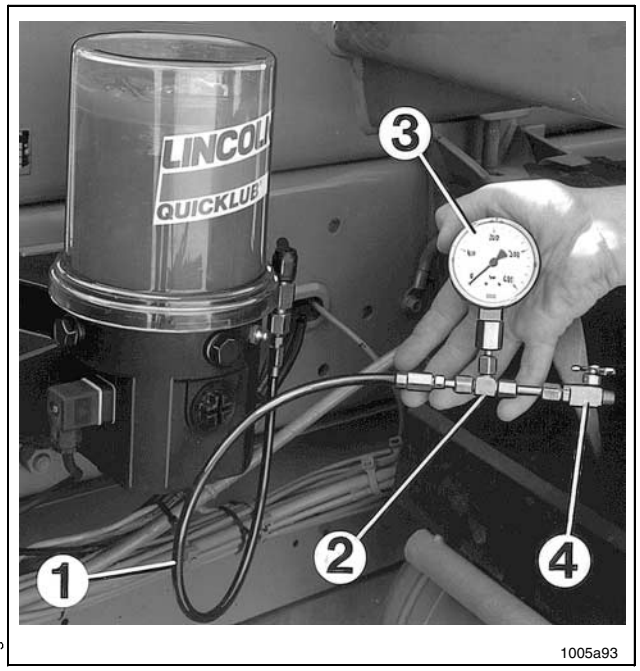


Fig. 25 To check the safety valve

1st option

- ➲ Connect the pressure gauge (0-600 bar; 0-8708 psi) to the safety valve (Fig. 23).
- ➲ Trigger an additional lubrication cycle.

2nd option

- ➲ Connect the manual pump of the pressure and checking set 604-36879-1 to the safety valve and check the opening pressure by means of the manual pump.
- ➲ The safety valve should open at a pressure of 250 or 350 bar depending on its design.


6001a02

IMPORTANT

Do not connect the pressure gauge directly to the pump element. High pressure may exceed the above mentioned range, causing the motor to stall. The motor is designed in such a way that it can stall for about 30 minutes without being damaged.

1 - Hose line, min.length 1m
2 - T-piece
3 - Pressure gauge
4 - Relief cock

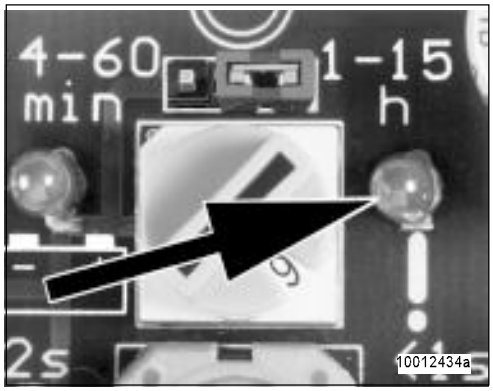


Fig. 14 - LED for the monitoring time or fault indication

Functional check

- Each time the machine contact (external contact) or the driving switch is switched on, a functional check of the drive motor and signal lamp takes place automatically.
- During the functional check the motor is switched on for **0.1 second** (the stirring paddle slightly rotates) and the signal lamp lights up for **2 seconds**.
- If there is a fault, the signal lamp **flashes**. See "Fault Indication".

Note: LED display fig.14 indicates the same operating state as the signal lamp.

Functions of the Pushbutton and Signal Lamp

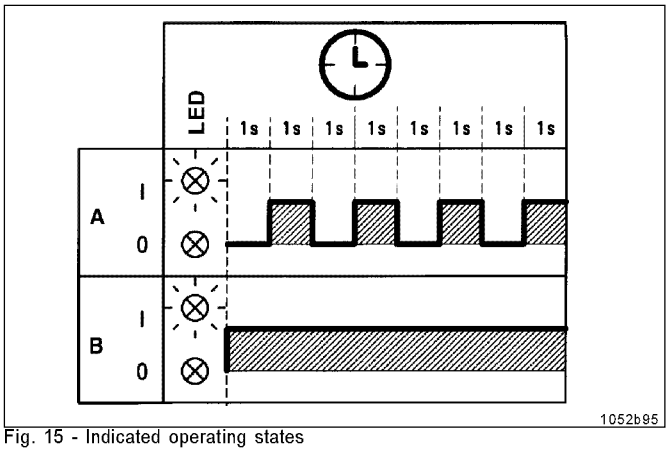


Fig. 15 - Indicated operating states

A - Fault indication
B - Indication of operation or acknowledged fault

Pushbutton (Fig. 16)

- The following functions can be performed with the pushbutton:
- triggering an additional lubrication cycle - Press pushbutton for over 2 seconds (> 2 s)
- fault acknowledgement < 1 s
- in the case of a fault, switching on pump again by pressing pushbutton (> 2 seconds)

Note: It is also possible to acknowledge any fault or to trigger an additional lubrication cycle via pushbutton 4 of the printed circuit board (Fig. 20).

Signal lamp

- The signal lamp or the LED fig. 14 indicates the operating state of the centralized lubrication system.
- The faults are indicated by different flashing frequencies of the signal lamp or the LED fig. 14. See "Fault Indication".

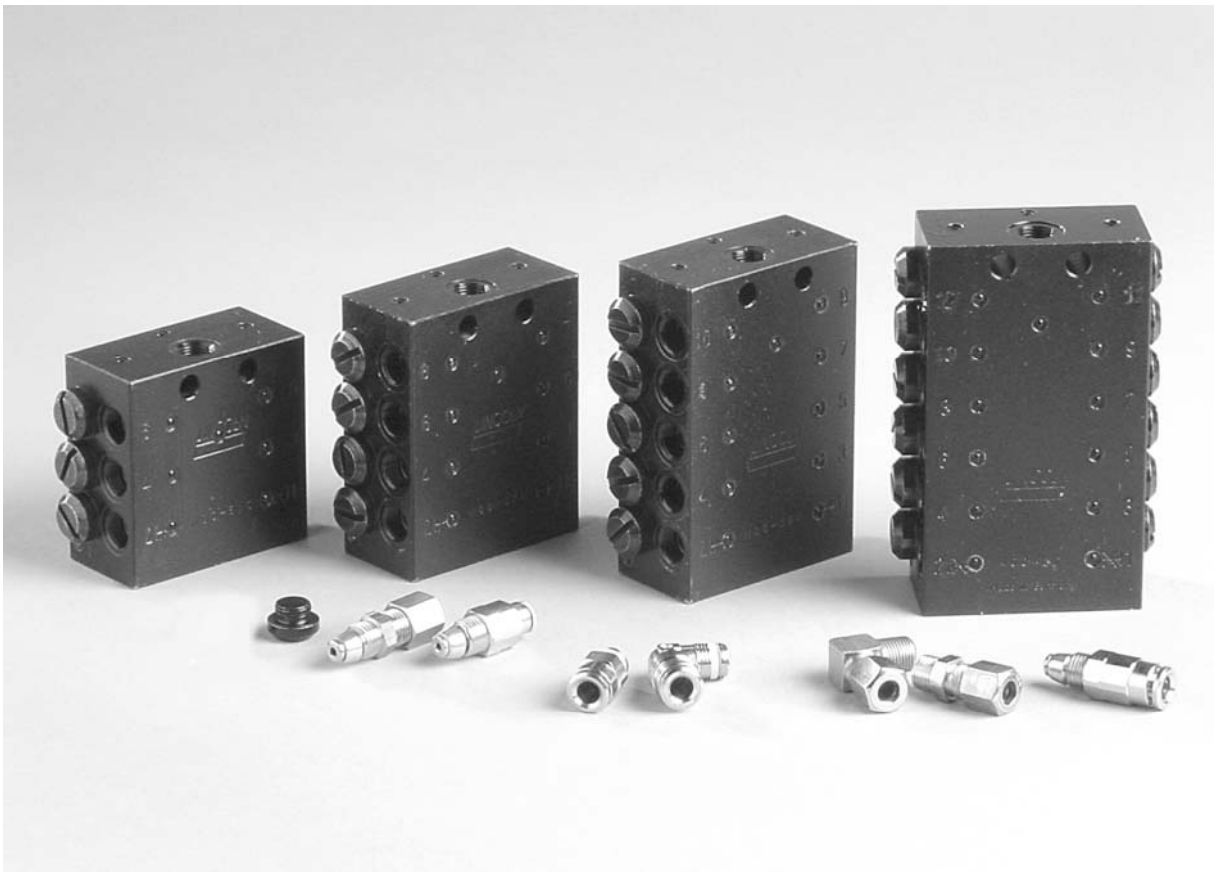
Fault Indication

See "The Faults and Their Causes"

2.2A-10001-D01

QUICKLUB - Progressive Metering Devices for Grease and Oil

Model SSV and SSV M
Planning and Layout of Progressive Centralized Lubrication Systems



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Planning and Layout, continuation

Instructions for QUICKLUB Progressive Systems, continuation

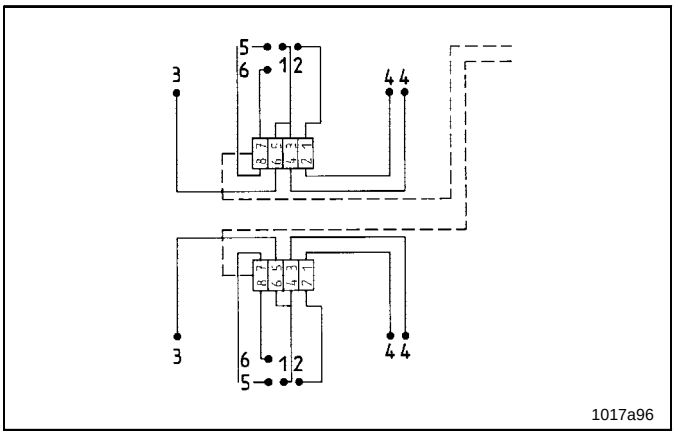


Fig. 37 Allocating the lubrication points

- If there is an odd number of lubrication points or if the lubrication points require a large lubricant quantity, select the next larger metering device.
- Close the outlets which are not required (see Fig. 37, outlet 5 or 6), **except for outlets 1 and 2.**
- Outlets whose lubricant output is higher due to the closing of preceding outlets must be connected to the lubrication points with an increased lubricant requirement.

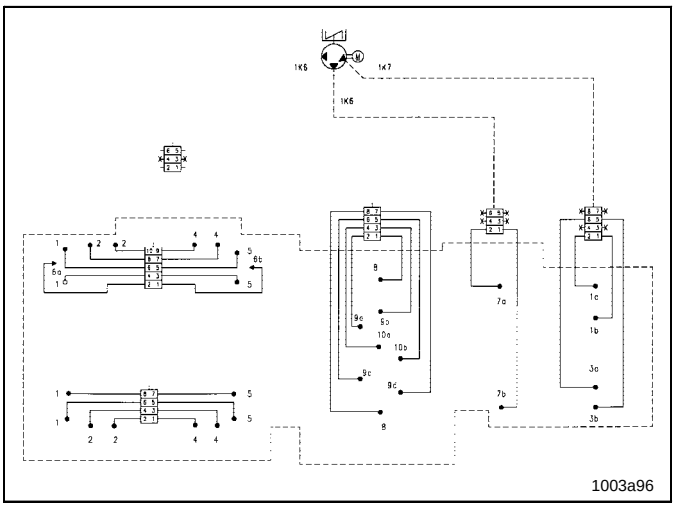


Fig. 38 Determining the size of the main metering device

7. Determining the size of the main metering device

- First, allocate one outlet of the main metering device to each secondary metering device.
- If possible, supply the same lubricant quantities to similar lubrication points.
- Check whether one or more secondary metering devices require larger lubricant quantities. See direct connection of the metering device to respectively one single pump element, example Fig. 38.
- If necessary, modify the allocation of the lubrication points.
- Maximum size of the main metering device: SSV 12

NOTE

In besonderen Fällen sind auch größere Verteiler (bis 22 Auslässe) als Hauptverteiler einsetzbar.

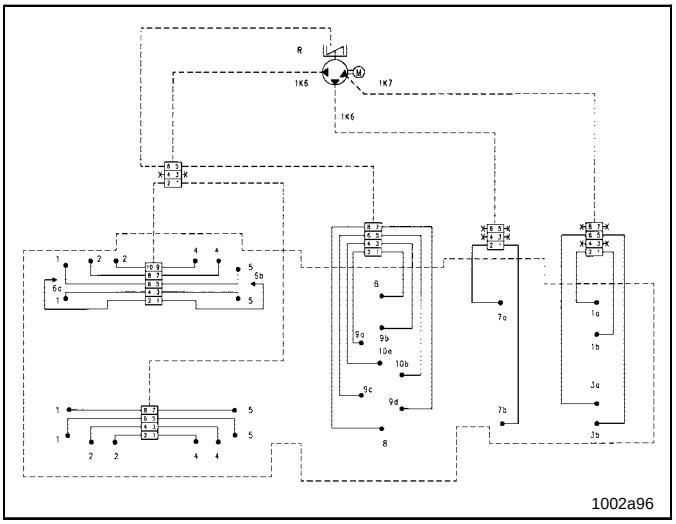
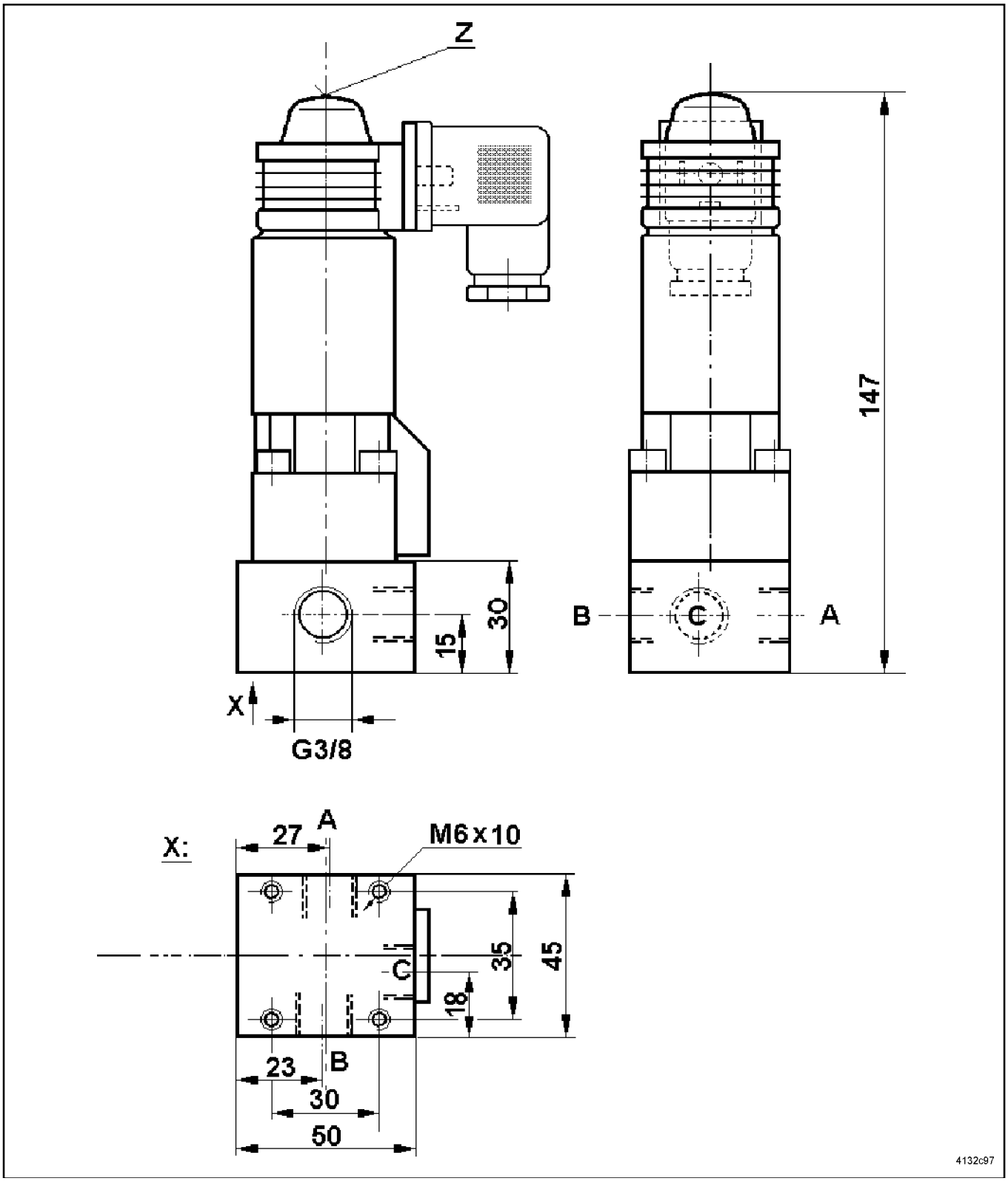


Fig. 39 Divided lubricant quantity

8. Dividing the lubricant quantity

- Each lubrication point should be supplied with lubricant at least once every day, at the latest on the next day.
- Avoid overlubrication, i.e. too much lubricant per day and per lubrication point.
- Avoid underlubrication, i.e. too little lubricant per day and per lubrication point.
- To fulfill these conditions, adhere to the following:
  - Adjust the operating time in such a way that the pump supplies lubricant to the lubrication points at least once a day. See ”Determining the operating time of the pump”.
  - Adjust the pause time in such a way that the frequency of the lubricant supply meets the operating or application conditions of the machine or vehicle.
  - Divide the lubricant quantities as shown in the example Fig. 39. Also see the calculation example in Fig. 40.
- Connect the outlets of the main metering device which are not used to the pump via a return line R.

3/2 - way valve



Note: The plug connection of the solenoid plug can be turned by 180° by removing the two screws

A, B - Connectors
Z - Manual emergency button

- Does the motor **M10** work?

Y N

- The problem is coming from the electric part:
  - The temperature switch **B92** detects a too high temperature of the motor **M10**, wait until the motor is cold enough.
  - The fuse **F139** is not in service condition.
  - The temperature switch **B92** is defective.
  - The relay **K110** is not supplied (broke wire or connector) or is defective.

- Verify if the led corresponding to the solenoid valve **Y67** on the connection box **E1037** is on when you push the button **S158**.

Y N

- The problem is coming from the electric part:
  - The proximity switch **B106** (ladder locked) is defective.
  - The relay **B02** in **A1008_4** is defective.
  - The button **S158** or the wire between **S158** and **E1037** is broken.
- Change the faulty electric components.

- The solenoid valve **Y67** is defective or is not supplied (broken wire between **E1037** and **Y67**).
- Control the adjustment value of the pressure control valve. Is the value set at 110 bar?

Y N

- Adjust the pressure control valve (see adjustment of the pressure control valve).

- One or several components of the rotating cylinder **RCL** are defective. You can nevertheless make the ladder go down by switching the valve on the rotating cylinder.

3.2 Service trap

Problem: the service trap can not be unlocked

- When you press the button **S161** that controls the service trap unlocking, the trap gets not unlocked.
- Does the motor **M10** work?

Y N

- The problem is coming from the electric part:
  - The temperature switch **B92** detects a too high temperature of the motor **M10**, wait until the motor is cold enough.
  - The fuse **F139** is not in service condition.
  - The temperature switch **B92** is defective.
  - The relay **K110** is not supplied (broke wire or connector) or is defective.

- Verify if the led corresponding to the solenoid valve **Y70** on the connection box **E1037** is on when you push the button **S161**.

Y N

- The button **S161** or the wire between **S161** and **E1037** is broken.

2.2.3 Connectors

X70	8 poles / A1019	**X97-2**	6 poles / A1020 + 2 poles / A1014
X71	24 poles / A1019	**X97-3**	2 poles / A1014
X72	3 poles / A1019	**X97-4**	2 poles / A1014
X73	12 poles / A1019	**X98**	4 poles / A1020 + 2 poles / A1014
X74	5 poles / A1019	**X99-1**	6 poles / A1020
X75	2 poles / A1019	**X99-2**	6 poles / A1020
X76	2 poles / A1019	**X100**	3 poles / A1020
X77	4 poles / A1019	**X101**	3 poles / A1020
X78	12 poles / A1019	**X102**	4 poles / A1020
X79	2 poles / A1019	**X103**	8 poles / A1020
X80	3 poles / A1019	**X104**	3 poles / A1020
X81	7 poles / A1019	**X116**	70 poles / E1003
X82	16 poles / A1020	**X118**	40 poles / E1003
X83	8 poles / A1020	**X119**	9 poles / E1003
X84	16 poles / A1020	**X120**	9 poles / Elevation
X88	18 poles / A1020	**X121**	40 poles / E1003 Elevation
X89-2	4 poles / A1020	**X122**	70 poles / E1005 Elevation
X90	6 poles / A1020	**X300**	Kl31 Electronic ground E1005
X91	8 poles / A1020	**X330**	Kl31 Service ground E1005
X92	14 poles / A1020	**X500**	Terminal block E1005
X93	4 poles / A1020	**X501**	Terminal block attenuation
X94	18 poles / A1020	**X517-1**	3 poles / CAN1
X95	3 poles / A1020	**X517-2**	3 poles / CAN1
X95-1	4 poles / A1014	**X517-3**	3 poles / CAN1
X95-2	4 poles / A1014	**X560**	6 poles / diagnostic E1005 Quantum
X95-3	4 poles / A1014	**X561**	3 poles / Diagnostic E1005 Cense
X95-4	4 poles / A1014	**XT104**	3 poles / Test pumps I4
X96	4 poles / A1020	**XT105**	3 poles / Test pumps I3
X97-1	6 poles / A1020 + 2 poles / A1014		

2.3 Washer / wipers

The hydraulic excavator is provided like any other vehicle with a washer and a wiper to clean the cab's windshield.

A1008_1	Plate relay E1005
E1_1	Floodlight 70W / 24V fuel tank
E1_2	Floodlight 70W / 24V fuel tank reserve
E1_3	Floodlight 70W / 24V fuel tank
E1_4	Floodlight 70W / 24V fuel tank reserve
E6_1	Floodlight 70W / 24V front catwalk
E6_2	Floodlight 70W / 24V front catwalk reser.
E6_3	Floodlight 70W / 24V front catwalk
E6_4	Floodlight 70W / 24V front catwalk reser.
E18_1	Floodlight 70W / 24V counterweight res.
E18_2	Floodlight 70W / 24V counterweight res.
E18_3	Floodlight 70W / 24V counterweight res.
E18_4	Floodlight 70W / 24V counterweight res.
E58_1	Floodlight 70W / 24V top of cabin
E58_2	Floodlight 70W / 24V top of cabin
E1003	Power connection box
E1005	Cabin connection box
F12_3	35A fuse / fuel tank floodlight
F12_4	35A fuse / hydraulic tank floodlight
F12_5	25A fuse / counterweight floodlight
F12_6	25A fuse / counterweight floodlight
F20_6	100A fuse / engine
K20_3	Relay fuel tank floodlight
K20_4	Relay hydraulic tank floodlight
K20_5	Relay counterweight floodlight
K20_6	Relay counterweight floodlight
S10	Switch attachment floodlight
S22	Switch counterweight floodlight
U10	Floodlight elec. box control valves

X113	Connector 24 poles / E1003 ground
X116	Connector 70 poles / E1003
X118	Connector 40 poles / E1003
X121	Connector 40 poles / E1003 elevation
X310	Kl31 principal ground E1003
X330	Kl31 service ground E1005
X354	Kl30 supply E1003
X500	Terminal block E1005
X535_1	Connector 2 poles / 58_1
X535_2	Connector 2 poles / 58_2
X620_1	Connector 2 poles / E1_1
X620_2	Connector 2 poles / E1_2
X620_3	Connector 2 poles / E1_3
X620_4	Connector 2 poles / E1_4
X623_1	Connector 2 poles / E6_1
X623_2	Connector 2 poles / E6_2
X623_3	Connector 2 poles / E6_3
X623_4	Connector 2 poles / E6_4
X662	Connector 40 poles fuel tank
X672	Connector 12 poles U10
X721	Connector 24 poles / hyd. tank ground
X834	Connector 12 poles / counterweight
X835	Connector 12 poles / ground engine
X841_1	Connector 2 poles / E18_1
X841_2	Connector 2 poles / E18_2
X842_1	Connector 2 poles / E18_3
X842_2	Connector 2 poles / E18_4
X860	Connector 24 poles / engine

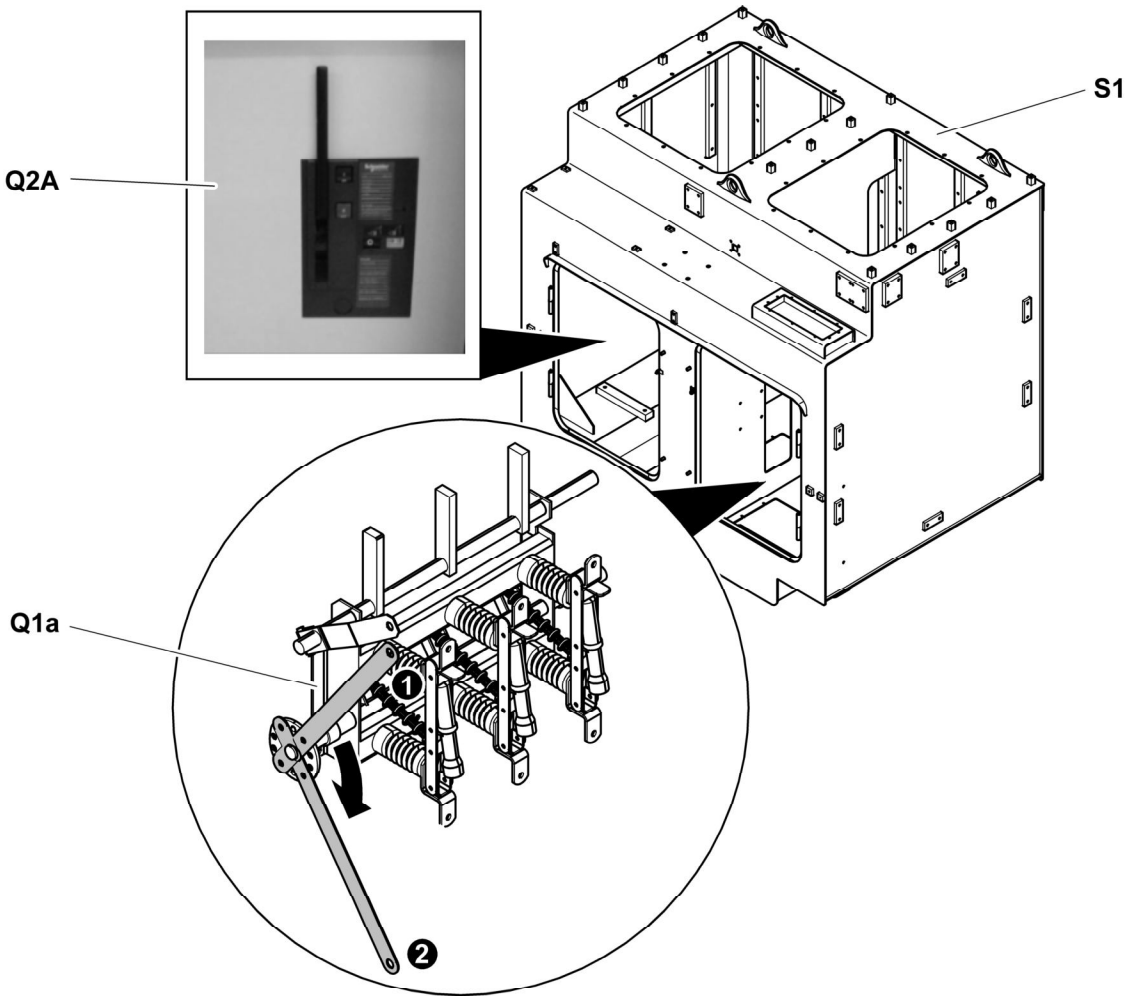


Fig. 9 *High voltage breakers **Q1a** and **Q2A***

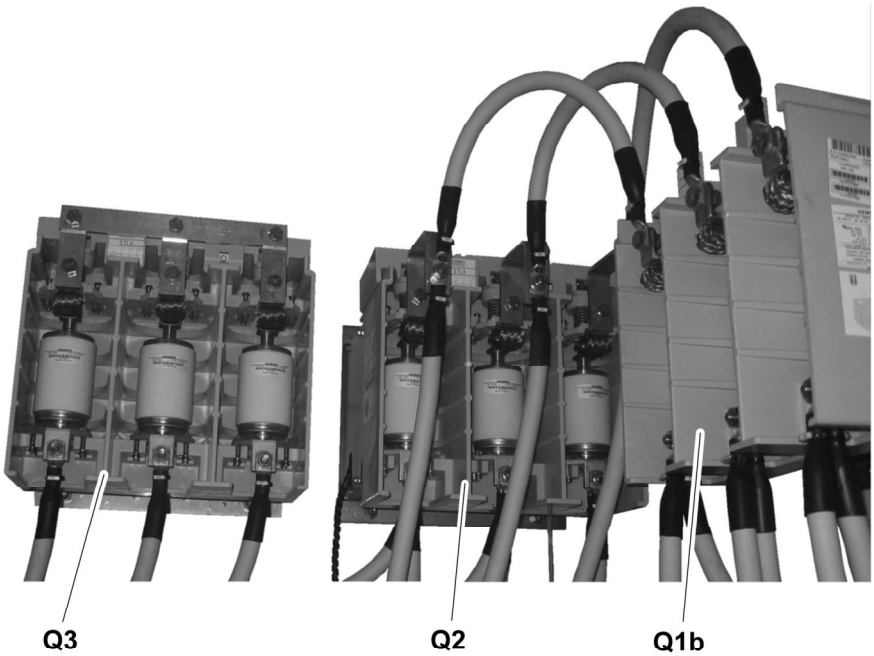


Fig. 10 *High voltage contactors **Q1b**, **Q2** and **Q3**, in **S1**.*

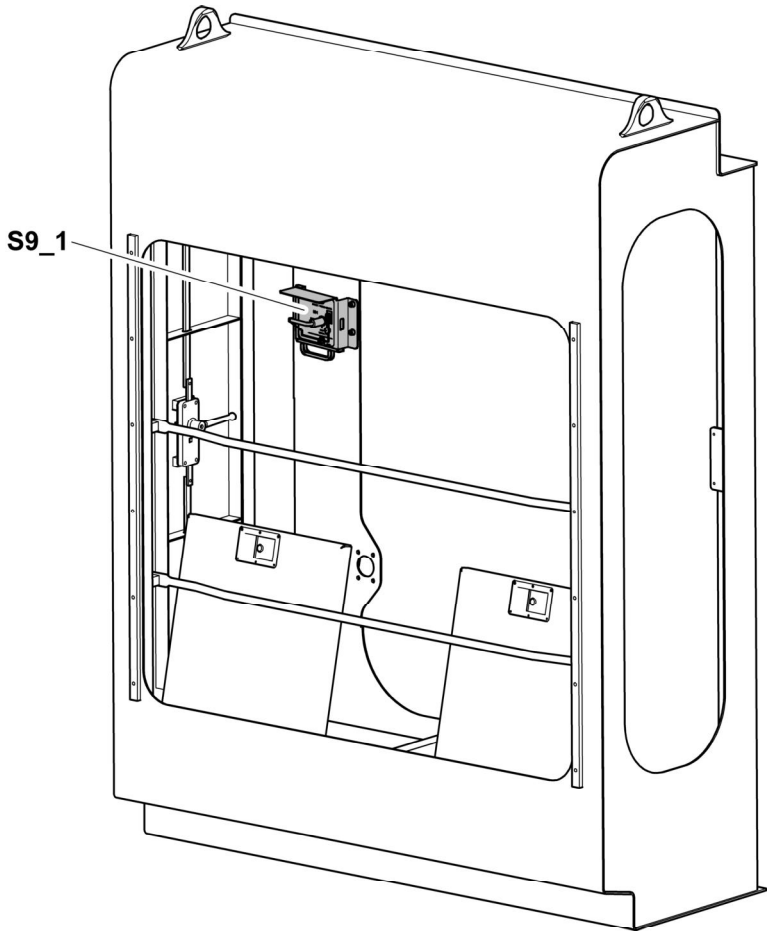


Fig. 17 *Switch **S9_1** location*

5.3 Function

5.3.1 Batteries

The excavator is equipped with 6 batteries: 4 principal batteries and two service batteries.

The principal batteries **G1**, **G2**, **G3** and **G4** deliver 24V when there is no current coming from the fieldswitch and in emergency mode (to lower attachment in safety position). They supply:

– The principal circuit Kl30 in **E1003**.

The service batteries **G6** and **G7** supply:

– The motor **M10** for ladder and service trap depending on fuse **F139**.
– the service lighting depending on fuse **F138** (see § «Lighting»).
– the control board depending on fuse **F138**.

When the batteries are discharged, it is possible to supply the electrical circuits of the excavator with external sources (24V) thanks to the connectors **X60-1** and **X60-2**.

5.3.2 Charging the batteries

The batteries are charged by a charger. It is located in the cab elevation and is supplied by the fieldswitch via **S2**.

7.11 EVENTS

Event x source	See section 7.11.1 and 7.11.2	Disabled	
Event x target	Select a connected MasterBus device that should take action due to a Mass Charger event.	Select…	Selectable targets are system dependent.
Event x command	Action to be taken by the target device.	Select…	See command list in selected device manual
Event x data	Data is linked to the command. See also figure 10.	Off	Off, On, Copy, Copy Invert, Toggle.
Event x+1	The next event appears after enabling Event x.	Disabled	See Event x.

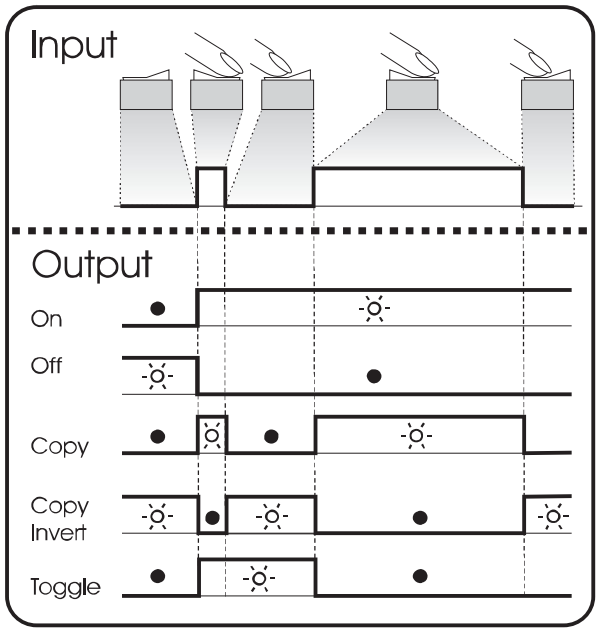


Figure 10 shows the meaning of the event data.

Input (pulses)
The input is represented by an on/off switch.

Output (data)
On changes the status to On at the first signal.
Off changes the status to Off at the first signal.
Copy lets the status follow the input.
Copy Invert lets the status follow the opposite of the input
Copy is used for dimming too by holding the pulse switch pressed for a longer time.
Toggle changes the status at the first signal and back at the second signal. It is used in combination with a pulse switch.

Figure 10: Event data

7.11.1 Mass Charger event source list (Mass Charger as event source)

Charging	Mass Charger state is On
Bulk	Charge stage is Bulk
Absorption	Charge stage is Absorption
Float	Charge stage is Float
Failure	Charger failure MasterBus alarm
CSI	Charger Status Interface MasterBus alarm to generate an audible alarm at charger failure
Equalize	Mass Charger is in Equalize mode
TC Error	Battery temperature sensor error
Fan	MasterBus signal for an external fan to start (at 50% load / 50°C)
LED Bulk	LED Bulk illuminates
LED 20-40	LED 2 illuminates (see figure 3)
LED Abs	LED Abs illuminates
LED 60-80	LED 4 illuminates (see figure 3)
LED Float	LED Float illuminates
LED Failure	LED Failure illuminates

7.11.2 Mass Charger event target list (Mass Charger as event target)

Mpc reduce	Command to reduce AC current at a 5%/sec rate
Mpc off	Command to reduce AC current fast
Bulk	Command to start the Bulk stage of charge
Absorption	Command to start the Absorption stage of charge

On/ Standby	Command to switch on the Mass Charger

- Connection box pump transmitters

Error code	Effect	Cause	Measure / remedy
E311	No CAN 1 connection on **E1036** (connection box pump transmitters)		Consult LIEBHERR customer service.
E320	No CAN 1 connection between **E1036** (connection box pump transmitters) and translater **J1939**		Consult LIEBHERR customer service.

- Joysticks

Error code	Effect	Cause	Measure / remedy
E411	Problem on **A1020** - **X96/3** / Swing control	Zero point not already started	Consult LIEBHERR customer service.
E413		Broken wire, Current >21mA or <3mA	
E414	Problem on **A1020** - **X96/4** / Stick control	Zero point not already started	Consult LIEBHERR customer service.
E416		Broken wire, Current >21mA or <3mA	
E417	Problem on **A1020** - **X98/3** / Tilt control	Zero point not already started	Consult LIEBHERR customer service.
E419		Broken wire, Current >21mA or <3mA	
E420	Problem on **A1020** - **X98/4** / Boom control	Zero point not already started	Consult LIEBHERR customer service.
E422		Broken wire, Current >21mA or <3mA	
E423	Problem on **A1020** - **X100/3** / Travel left control	Zero point not already started	Consult LIEBHERR customer service.
E425		Broken wire, Current >21mA or <3mA	
E426	Problem on **A1020** - **X101/3** / Travel right control	Zero point not already started	Consult LIEBHERR customer service.
E428		Broken wire, Current >21mA or <3mA	
E429	Problem on **A1020** - **X102/3** / Trap open control	Zero point not already started	Consult LIEBHERR customer service.
E431		Broken wire, Current >21mA or <3mA	
E432	Problem on **A1020** - **X102/4** / Trap close control	Zero point not already started	Consult LIEBHERR customer service.
E434		Broken wire, Current >21mA or <3mA	
E435	**A1020** coding plug unknown		Consult LIEBHERR customer service.

- Error due to warning symbols in the SY Field

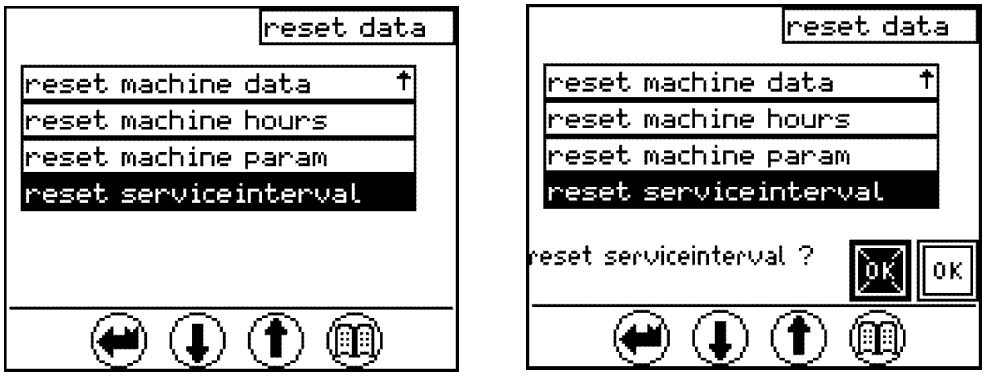


Fig. 72 *"reset service intervals" function selection and application*

Menu "set hour"

This menu allows to set separately all the hour meters mentioned in the menu "i-hour":

– Electric motor,
– Hydraulic,
– Swing,
– Travel,
– Power manu,
– Flow manu.

▶ Use the arrow keys to select the component, whose operating hours must be displayed or changed.

▶ Confirm your choice using the "Menu" key.
③ The indication of the desired operating hours will appear on the screen.

▶ Use the arrow key to change the operating hours by one digit.

▶ Press the arrow key and the "Menu" key at the same time to change the operating hours by 10 digits at once.

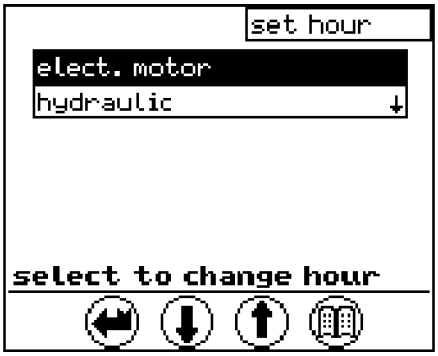


Fig. 73 *Electric motor selection*

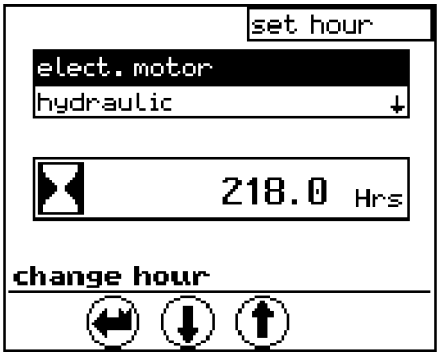


Fig. 79 *Electric motor setting*

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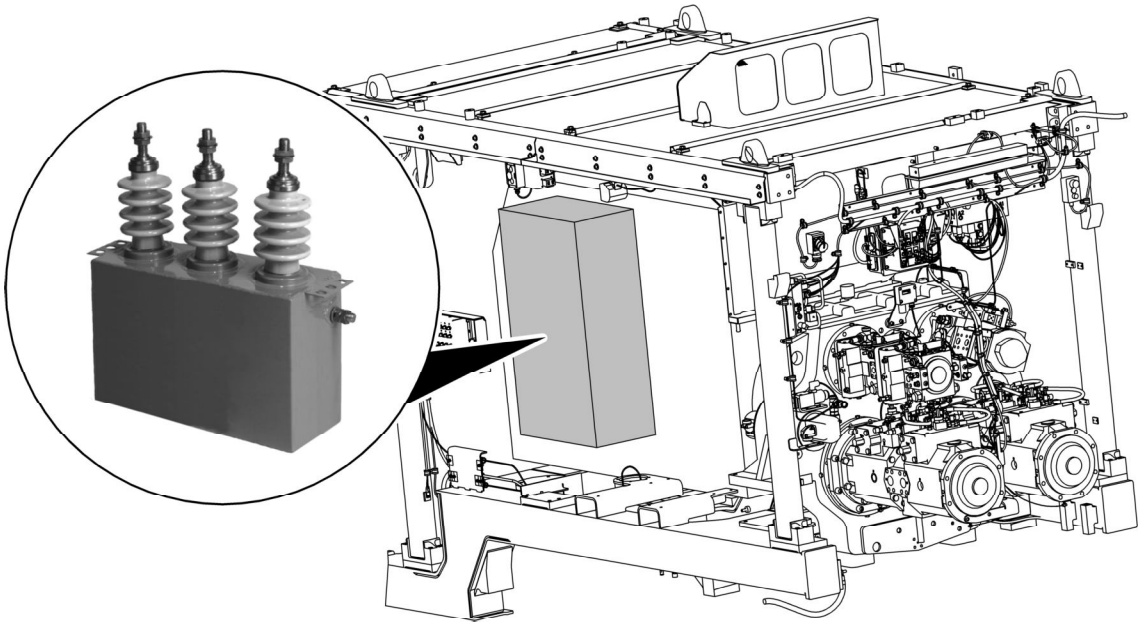


Fig. 93 *ZORC*

8.8 Other motors

The main other electrical motors are:

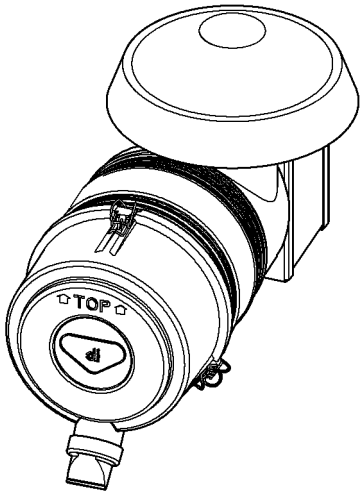
Air conditioner motor

Refer to chapter 18 «Heater and air conditioning».

Cabin heater motor

Refer to chapter 18 «Heater and air conditioning».

Pressurization devices



The pressurization devices are located:

– at the rear of the cabin
– on top of **S1**
– at the rear of **S2**, in the Powerpack.

ate an over pressure in the cabin and in the electrical boxes. They are aimed at protecting electrical

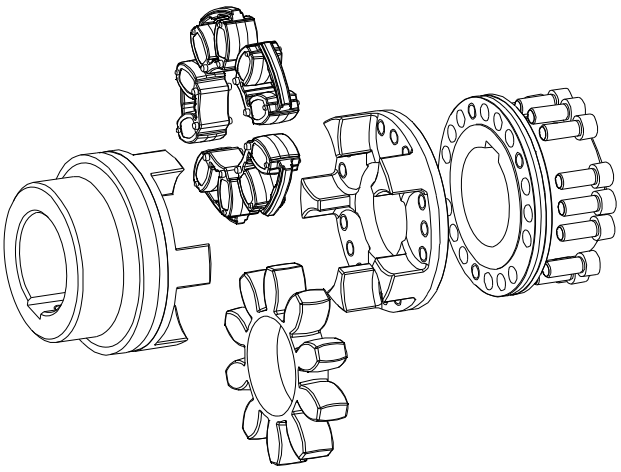
5 Enclosure A

Hints and Instructions Regarding the Use in Ex Hazardous Areas

5.2 Control Intervals for Couplings in Ex Hazardous Areas

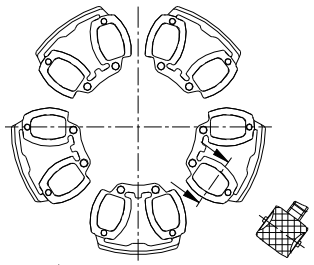
explosion group	control intervals
3G 3D	For couplings which are classified in category 3G or 3D the operating and assembly instructions that are usual for standard operation apply. During the standard operation which has to be subject to the analysis of danger of ignition the couplings are free from any ignition source. Merely the temperature increase produced by proper heating and depending on the coupling type has to be considered: for ROTEX®: $\Delta T = 20$ K
II 2GD c IIB T4, T5, T6	A checking of the circumferential backlash and a visual check of the flexible spider/ elements DZ must be effected after 3,000 operating hours for the first time, after 6 months at the latest. Except for centered, stiff connecting flanges (e. g. bellhousings). If you note an unconsiderable or no wear at the spider/elements DZ after this first inspection, the further inspections can be effected, in case of the same operating parameters, respectively after 6,000 operating hours or after 18 months at the latest. If you note a considerable wear during the first inspection, so that a change of the spider/ elements DZ would be recommended, please find out the cause according to the table „Breakdowns“, as far as possible. The maintenance intervals must be adjusted according to the changed operating parameters.
II 2GD c IIC T4, T5, T6	A checking of the circumferential backlash and a visual check of the flexible spider/ elements DZ must be effected after 2,000 operating hours for the first time, after 3 months at the latest. Except for centered, stiff connecting flanges (e. g. bellhousings). If you note an unconsiderable or no wear at the spider/elements DZ after this first inspection, the further inspections can be effected, in case of the same operating parameters, respectively after 4,000 operating hours or after 12 months at the latest. If you note a considerable wear during the first inspection, so that a change of the spider/ elements DZ would be recommended, please find out the cause according to the table „Breakdowns“, as far as possible. The maintenance intervals must be adjusted according to the changed operating parameters.

ROTEX® coupling

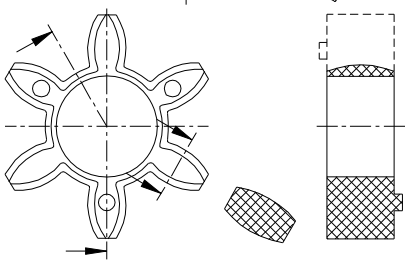


picture 27: ROTEX® coupling (expample: type BFN)

picture 28.1: ROTEX® elements DZ



picture 28.2: ROTEX® spider



Here the backlash between coupling cams and the flexible spider/element DZ must be checked by a feeler gauge.

When reaching the limit of wear of max. friction, the spider/element DZ must be exchanged immediately, independent of the inspection intervals.

4. Einbau • 4. Mounting

Zum Umbau der Zwangsschmierung von „gesperrt“ in „offen“ müssen alle Dichtungen (Pos. 136) ersetzt werden.

Beachten Sie die Hinweise auf der Einbauzeichnung 0/6095/5006/2 Blatt 3.

Befestigen Sie das Getriebe sicher am Geräterahmen, bevor Sie die Anschlagmittel entfernen.

- **Vermeiden Sie beim Einbau unbedingt grobe Schläge.**

Vermeiden Sie unbedingt Axialkräfte.

- **Vermeiden Sie unbedingt hohe Druckkräfte auf das Getriebegehäuse.**
- **Beachten Sie die Einbauzeichnung und die zugehörigen Daten.**
- **Bauen Sie das Getriebe verwindungsfrei ein.**

Hängen Sie das Getriebe an den Kran.

Heben Sie das Getriebe in den Geräterahmen.

Ziehen Sie die Befestigungsschrauben mit einem Drehmomentschlüssel an. Entnehmen Sie die Anzugsmomente der Rahmenzeichnung.

Entfernen Sie die Transportmittel.

Entfernen Sie die Schutzstopfen an den Pumpenanschlüssen vor dem Anschrauben der Pumpen.

Achten Sie darauf, daß kein Schmutz oder Fremdkörper in das Getriebe gelangt.

Bauen Sie die Pumpen an. Beachten Sie unbedingt die Angaben des Herstellers.

- **Achten Sie beim Anbau der Pumpen auf sorgfältige Abdichtung.**
- **Schließen Sie alle zum Betrieb des Getriebes erforderlichen Versorgungsleitungen und Anbauteile an. Beachten Sie hierzu die Angaben auf der Einbauzeichnung 0/6095/5006/2 (Blatt 1-3).**

For conversion of pressure lubrication from „blocked“ to „open“ all seals (item 136) must be replaced.

Observe the information given on the installation drawing 0/6095/5006/2 page 3.

Secure the gearbox safely before removing the lifting straps or ropes.

- **Avoid heavy blows when mounting the equipment.**

Make sure that axial forces are not exerted during mounting.

- **Make sure high compressive forces do not act on the gearbox housing.**
- **During this work observe installation drawing as well as pertinent data.**
- **When mounting the gearbox make sure it is free from distortion.**

Attach the gearbox to a crane.

Lift the gear into the equipment frame.

Tighten the screws using a torque wrench. The relevant tightening torques shall be taken from the frame drawing.

Remove the lifting straps or ropes.

Remove all protective plugs from the pump connections before attaching the pumps.

Make sure that no dirt or foreign bodies are allowed to enter the gearbox.

Mount the pumps. Carefully observe the respective instructions given by the manufacturer.

- **When mounting the pumps make sure that they are properly sealed off.**
- **Connect all ports and attachment parts wich are indispensable to put the gearbox into operation. Follow the instructions given on the installation drawing 0/6095/5006/2 (Page 1-3).**

Der Einsatz synthetischer Öle auf Basis von Polyglykolen (PG) und biologisch abbaubare Öle auf Basis synthetischer Ester sind auf Grund möglicher Materialunverträglichkeiten von Bosch Rexroth nicht zugelassen!

Sollte eine dieser Öltypen in Betracht gezogen werden, ist eine vorherige, schriftliche Anfrage an Bosch Rexroth zu stellen.

Anwendungstechnische Aspekte sind zwischen dem Systemhersteller oder dem Betreiber der Anlage und dem Schmierstoffhersteller abzustimmen.

Getriebeöle, denen VI-Verbesserer zugegeben wurde, können während der Einsatzzeit ohne äußere Einflüsse zum Abbau der vorgesehenen Schmierstoffviskosität führen. VI-Verbesserer sind mehr oder weniger scherempfindlich und reagieren unterschiedlich stark auf mechanische Belastungen.
Da in den Produktdatenblättern üblicherweise keine Hinweise auf VI-Verbesserer oder auf Scherstabilität angegeben sind, sollte der Anwender vor Einsatz eines Öles hierzu beim Hersteller nachfragen.

Eine, für den Anwender bindende Vorgabe, ist die auf dem Typschild und/oder in der Betriebsanleitung angegebene Viskosität sowie eventuelle Sonderhinweise auf eine bestimmte Ölsorte.
Wird auf dem Typschild und/oder in der Betriebsanleitung explizit eine Ölsorte angegeben, tritt die Auswahlhilfe aus Tabelle 1 außer Kraft.

Bei Verwendung einer anderen Viskosität oder eines anderen als hier angegebenen oder in der Liste aufgeführten Getriebeöles übernimmt der Betreiber die Verantwortung für die Eignung des Schmierstoffes. Die Benutzung von Schmierstoffen, die nicht den spezifizierten Qualitätsanforderungen entsprechen, kann Bosch Rexroth die Gewährleistungsbedingungen für das Getriebe außer Kraft setzen.

Es wird ausdrücklich darauf hingewiesen, dass jeder Ölhersteller oder der Öllieferant (bei REBRAND-Produkten) für die Qualität seines Produktes verantwortlich ist.

Soll ein nicht freigegebenes Getriebeöl zum Einsatz kommen, ist eine vorherige, schriftliche Rücksprache mit Bosch Rexroth vorzunehmen.

7 Ölauffüllung und Ölwechsel

Die Betriebssicherheit und die Lebensdauer des Getriebes hängen von einer ordnungsmäßigen Wartung ab.

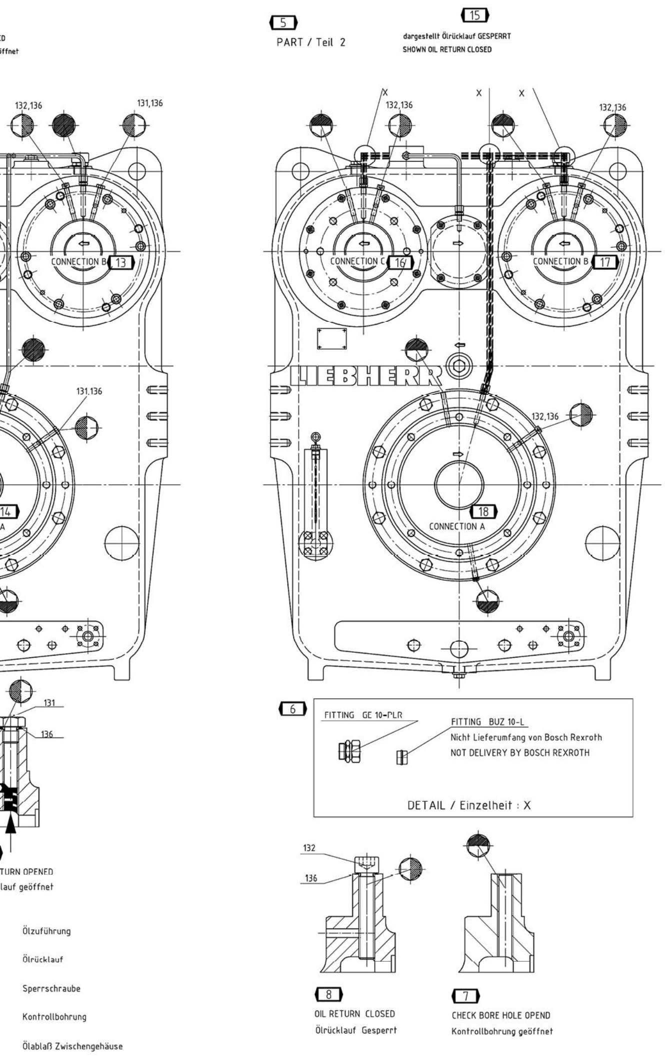
Sollte es während des Betriebsablaufs notwendig werden, das erforderliche Ölstandsniveau durch Auffüllen von Frischöl korrigieren zu müssen, ist vorher die Ursache für die zu geringe Ölmenge zu untersuchen. Mögliche Leckage.
Beim Nachfüllen von Öl ist unbedingt darauf zu achten, dass es sich um die gleiche Sorte und Viskosität des schon eingefüllten Öles handelt. Werden Öle verschiedener Hersteller oder verschiedene Typen gleicher Hersteller vermischt, können Additivreaktionen unter Umständen zu negativen Eigenschaften des Schmiersystems oder auch zu Störungen und Schäden am Getriebe führen.

Vor einem Ölwechsel sind immer die Vorschriften in der jeweiligen Betriebsanleitung zu beachten. In Zweifelsfällen oder bei Widersprüchen ist Rücksprache mit Bosch Rexroth zu nehmen. Wartungsarbeiten wie Ölwechsel sollten immer nur von geschultem Fachpersonal durchgeführt werden.

Der Ölwechsel ist grundsätzlich nur mit Frischöl der vorher verwendeten Ölsorten durchzuführen. Das Mischen von Ölen verschiedener Sorten oder Hersteller ist nicht zulässig.

Sollte aus zwingenden Gründen eine andere Sorte oder ein Produkt von einem anderen Hersteller notwendig werden, hat der Hersteller der neuen Sorte eine schriftliche Unbedenklichkeitserklärung abzugeben. Hierüber ist Bosch Rexroth schriftlich zu informieren.

Bei Umstellung von Ölen mit unterschiedlicher Basis ist das Getriebe incl. aller Ölversorgungsbauteile gründlich mit der neuen Ölsorte zu spülen. Spülen mit Reinigungsmitteln oder mit Petroleum ist nicht statthaft.



▽	ALL PUMP DISTRIBUTION GEARBOXES FOR EMPLOYMENT IN EXCAVATOR R9250 ARE EXCLUSIVELY SUPPLIED WITH OPENED "INTERNAL OIL RETURN".	Alle Pumpenverteilergetriebe für den Einsatz im Bagger R9250 werden nur mit geöffnetem "internen Ölrücklauf" ausgeliefert.
▽	CAUTION! FOR CHECKING THE HYDRAULIC PUMPS FOR LEAKAGES (DISPLAY "ALARM" GEARBOX OIL LEVEL), THE OIL RETURN MAY BE LOCKED AS DESCRIBED IN THE FOLLOWING STEPS.	Achtung! Zur Überprüfung der Hydraulikpumpen auf evtl. Leckagen (Anzeige "Alarm" Getriebeölstand) darf der Ölrücklauf wie folgt beschrieben gesperrt werden.
▽	THE DISPLAY "ALARM OIL LEVEL/PUMP CONTROL" IS ACTIVATED VIA THE GEARBOX MONITORING SYSTEM PROVIDED BY LIEBHERR.	Die Anzeige "Alarm Getriebeölstand/Pumpenkontrolle"erfolgt über die von LIEBHERR vorgesehene Getriebeüberwachung.
	CHECKING OF THE HYDRAULIC PUMPS FOR LEAKAGES AT "ALARM GEARBOX OIL LEVEL/PUMP CONTROL".	Uberprüfung der Hydraulikpumpen auf evtl. Leckagen bei "Alarm Getriebeölstand / Pumpenkontrolle"
⚠	OBSERVE THE CORRESPONDING INFORMATION IN THE MACHINE OPERATING MANUAL OF THE MINING SHOVEL.	Beachten Sie unbedingt die Hinweise im Maschinenhandbuch des Baggers.
●	SEPARATE THE 3 OIL LINES FROM GEARBOX LUBRICATION.	Trennen Sie die 3 Ölzuführungsleitungen von der Getriebeschmierung.
◐	REMOVE THE SCREWS (M12X12), ITEM 131: ATTENTION: SCREWS ARE STILL NEEDED. SEE INSTALLATION DRAWING 2/6095/5005/2, PAGE 3, PART 2.	Entfernen Sie die Schrauben (M12x12), Pos. 131. Achtung: (Schrauben werden noch benötigt) See installation drawing 2/6095/5005/2, Blatt 3, Teil 2.
⚠	MOUNTING AND DISMOUNTING OF OIL LINES AND BOLTS (ITEM 131; 132) MAY ONLY BE CARRIED OUT BY TRAINED PERSONNEL AND AT MACHINE STANDSTILL. THE RELEVANT ACCIDENT PREVENTION- AND SECURITY REGULATIONS MUST BE OBSERVED.	An- bzw. Abbau der Ölrücklaufleitungen, sowie der Schrauben (Pos. 131; 132) sind nur durch geschultes Personal und im Maschinenstillstand vorzunehmen. Unfallverhütungs- und Sicherheitsbestimmungen sind zu beachten.
	UNSCREW THE STOPPAGE SCREWS (M12X65), ITEM 132	Drehen Sie die Sperrschrauben M12x65 (Pos. 132) heraus.
◑	AFTERWARDS, FIRMLY INSERT BOLTS M12X65 (STOPPAGE SCREW) (ITEM 132) PLUS NEW SEALS (ITEM 136) INTO PROVIDED THREAD HOLES UNTIL STOP END. SEE INSTALLATION DRAWING 2/6095/5005/2, PAGE 3, PART 2.	Schrauben Sie anschließend die Sperrschrauben M12x65 (Pos. 132) mit neuen Dichtungen (Pos. 136) in die dafür vorgesehenen Gewindebohrungen bis zu ihrer Kopfauflage fest ein. Siehe Einbauzeichnung 2/6095/5005/2, Blatt 3, Teil 2.
	THE PRESSURE LUBRICATION IS NOW BLOCKED.	Die Zwangsschmierung ist jetzt gesperrt.
▽	ENSURE THAT NO DIRT OR OTHER CONTAMIN-ANTS ARE ALLOWED TO ENTER THE GEARBOX.	Vermeiden Sie Verunreinigungen des Getriebes.
X	SEAL THE LUBRICATING OIL CONNECTIONS WHICH ARE ILLUSTRATED ON THE INSTALLATION DRAWING 2/6095/5005/2 (PAGE 3, PART 2) WITH PLUGS. (FOR EXAMPLE BUZ 10-L FROM THE COMPANY "PARKER").	Verschließen Sie die auf der Einbauzeichnung 2/6095/5005/2, Blatt 3, Teil 2 dargestellten Schmierölanschlüsse mit Stopfen (z.B. BUZ 10-L der Firma "Parker".)
	START MOTOR PUMP AGGREGATE IF OIL EMERGES AT THE CONTROL POINTS CHECK RELATED PUMP FOR LEAKAGES.	Starten Sie das Motorpumpenaggregat Bei vorhandenem Ölaustritt an den Kontrollstellen: Prüfen Sie die entsprechende Pumpe auf Leckagen
▽	CAUTION: AFTER CHECKING, THE PRESSURE LUBRICATION CONNECTIONS MUST BE RECONVERTED TO POSITION "OPEN". REINSERT BOLTS ITEM 131 AND ITEM 132 INTO THREAD HOLES PROVIDED FOR THIS PURPOSE AND CONNECT THE OIL SUPPLY LINES. SEE INSTALLATION DRAWIN2/6095/5005/2, PAGE 3, PART 1.	Achtung:Nach erfolgter Kontrolle müssen die Zwangsschmierungsanschlüsse wieder in Stellung "Offen" umgebaut werden. Dazu müssen Sie die Schrauben Pos. 131 und Pos. 132 wieder in die dafür vorgesehenen Gewindebohrungen einschrauben und die Ölzuführungsleitungen anschließen. Siehe Einbauzeichnung 2/6095/5005/2, Blatt 3, Teil 1.
▽	THE MOTOR PUMP AGGREGATE MAY ONLY BE PUT INTO OPERATION WHEN THE OIL RETURN IS OPENED.	Das Motorpumpenaggregat darf nur mit geöffnetem Ölrücklauf in Betrieb genommen werden.

9

10

OIL DISTRIBUTOR GEARBOX

Pumpenverteilergetriebe

Liebherr - Bagger : 9250 E 50 HZ

Liebherr - Ident-Nr. : 111 705 99

LOW-TEMPERATURE EXECUTION / Kälteausführung -40°C

geometrical tol. / Form-u.Lagetol. ISO 2768-2:1989-11 — tol.-class / T.-kl. H

size acc. to / Masse nach ISO 14405-1:2010-12

principle of independency / Unabhängigkeitsprinzip (LP)

characteristic ID acc.to / Merkmal-Kennung nach VA 21017-002 — symbol / Kennzeichen 18 — range / Ber. 1 99

del. characteristic No. / geloeschte Merkmal-Nr.

A-document / A-Dokument

Ind.	Change/Aend.	Date/Datum	Drawn/Gez.	Checked/Gepr.	Releas./Freig.	BWN	Resp. dept./Verantw. Abt.	Add. info./Zus. info.
2	ECR44877 BL1	20140219	kop2wit			7280	DC-MA/ETS2	
1	ECR38241 Bl1	20130625	gabrschu			7280	DC-MA/ETS2	
0	.	20110915	heikskon	ANDRKLIN	MATHALBE	7280	DC-MA/ETS2	

Treatment/Behandlung — Missed Details/Fehlende Angaben — Size/Gst. -

Mat./Stoff — From/Aus

Lang./Spr. EN/DE — Wght./Gew. 1000 kg — Rexroth Bosch Group — GFC 320/1006 — Sheet/Bl. 3/3

Crit. P. — Scale/Maßstab 1:5 — Mat. meets/Stoffe s. N2580-1 — Syst. ACA — Doc. type MSZ — 0/6095/5006/2 — DP/TD 003 — Ind. AC — Format A0

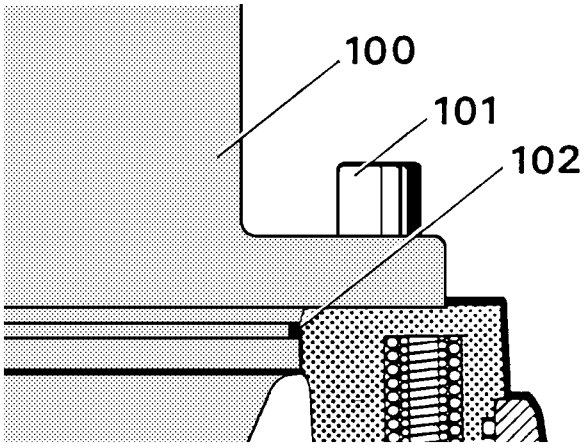
MNR R916010718 — Repl. for — Repl. by

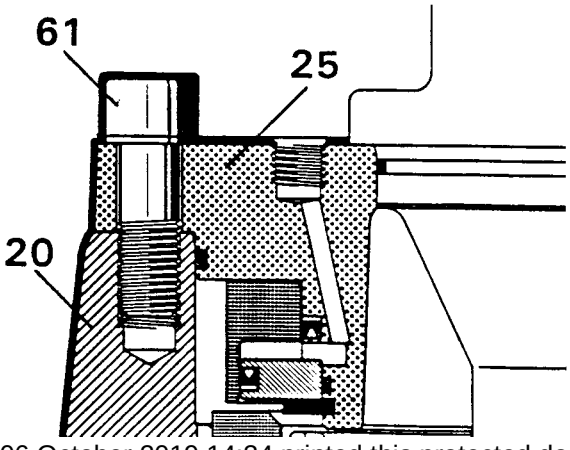
To measure the axial play of the output shaft bearing:

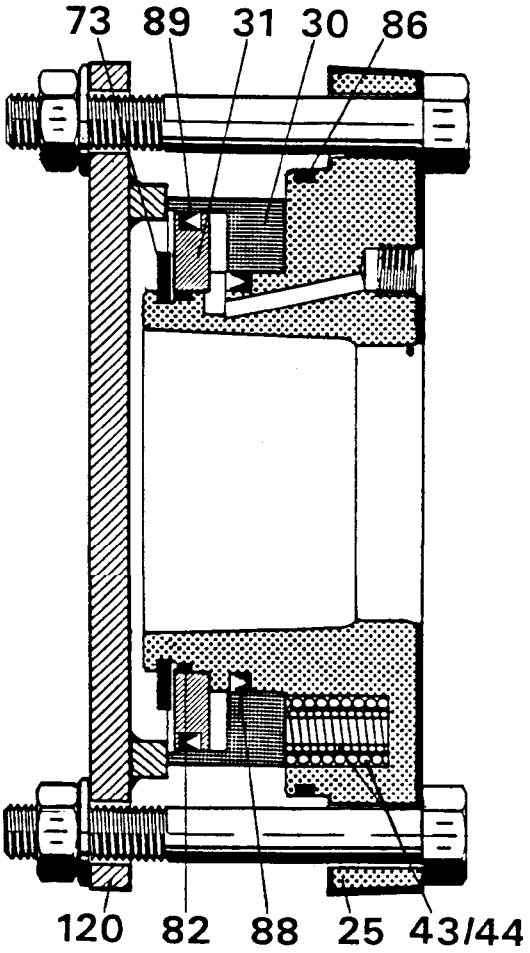
- ❑ The swing gear must not be disassembled from the machine to measure the axial play.
- ▶ Remove the screw plugs (from windings **1**) at the bottom of the grease cap.
- ▶ Install the measuring screw **2** and the dial gauge **3** in the windings **1** (in special case, it is necessary to adjust the screw in a nut with supporting at the spacer plate).
- ▶ Put the dial gauge **3** in correct position as illustrated above (it is not permitted to put the dial gauge on the grease cap: here the displacement of the grease cap is measured and not the axial play of the bearing).
- ▶ Tighten the measuring screw **2** with a tightening torque of 60 Nm.
  ↳ The resulting axial force is 24 kN.
- ▶ Monitor the deflection of the dial gauge **3**:
- – in new condition, no deflection on the dial gauge is allowed.
- – after operation, the deflection on the dial gauge must not be more than the limit value given in the table at the beginning of this section.
  ↳ If the measured axial play is more than the limit value, change the swing gear.
- ▶ The dial gauge deflection must be recorded at each measuring with the related serial number.

3.5 Sealing of the swing brake

3.5.1 To seal the gear







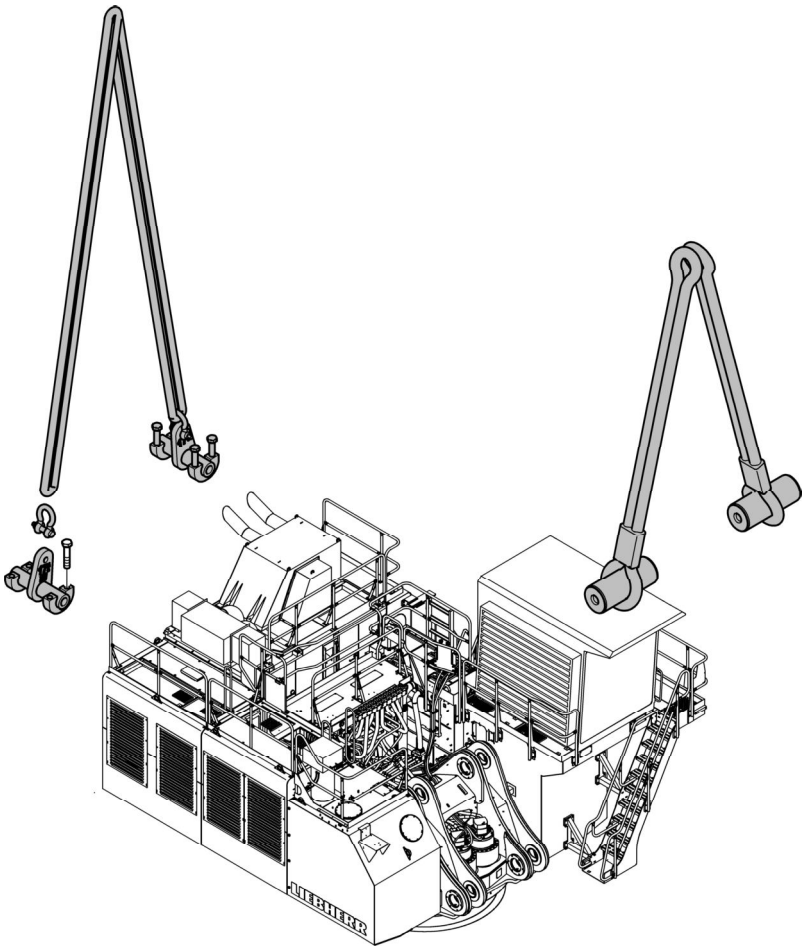


Fig. 12 *Uppercarriage lifting tool*

▶ Install on the rotating deck the lifting tool at the front and the rear of the uppercarriage.

▶ Use two cranes.

For more information about the uppercarriage lifting tool, refer to safe work procedure «Uppercarriage lifting and transport» in chapter 2 of this manual.

3 Pins / bushes

3.1 Component location

The following figures indicate the location of pins and bushes on the attachment (surrounded parts).

3.1.1 For an excavator with a backhoe attachment

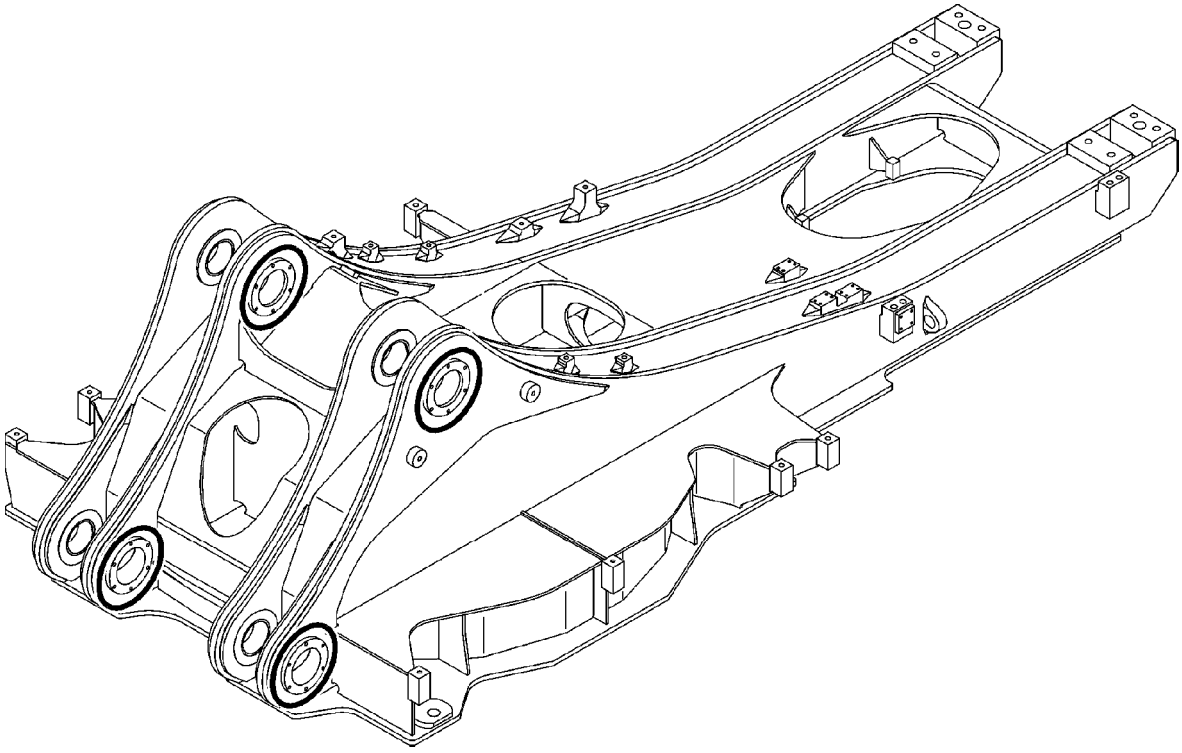


Fig. 7 *Rotating deck*

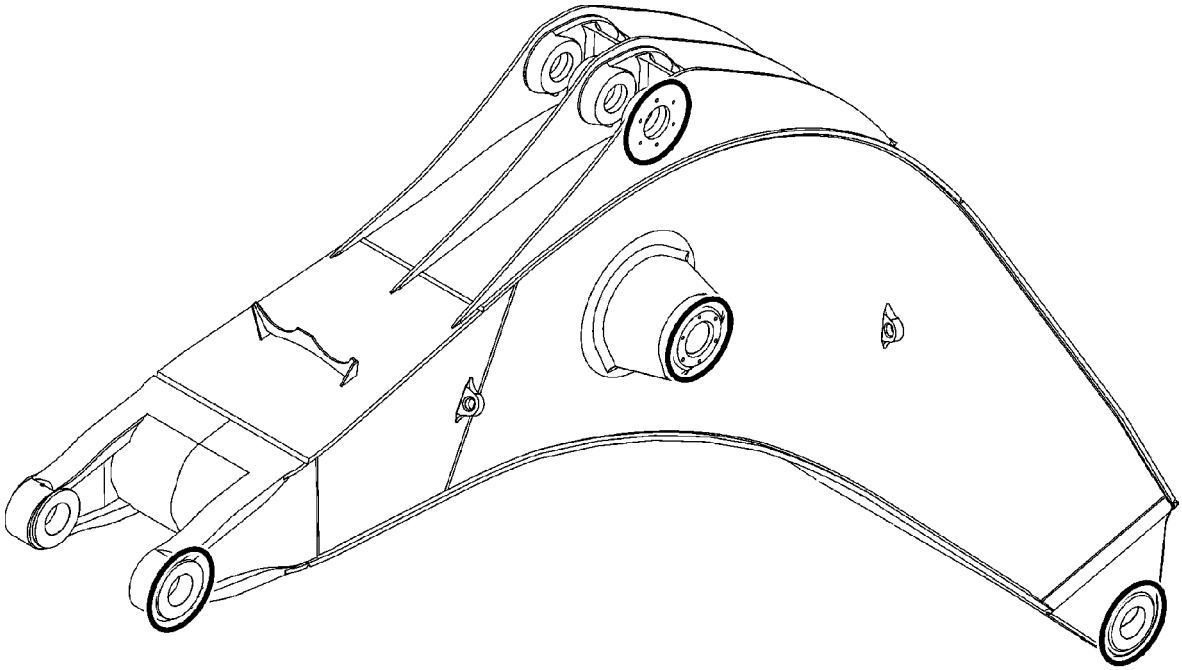
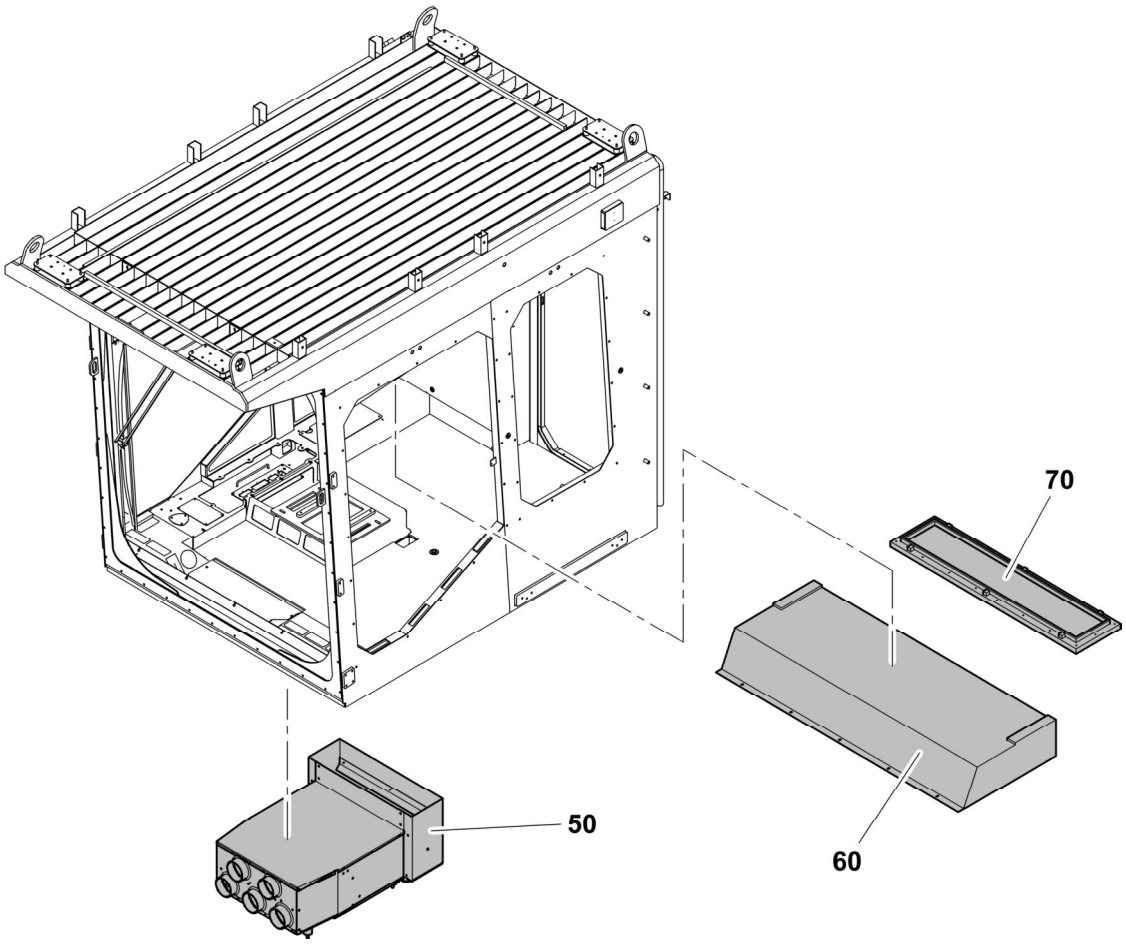


Fig. 8 *Boom*



50 Heater

60 Evaporator

70 Air grid

History of modification

Version	Date	Name	Remark	File
A00	12.06.2007	Pfluger	source file	110044952AA

1. Introduction

The control unit K6 is a controller for air conditioning- heating systems in modern vehicles. Through its compact construction it fits into every DIN radio duct. The simple and clear handling of all tasks for optimal air conditioning relieves the driver.

1.1. Installation

1. After carrying out the installation (wires laid out along the vehicle and 24-pole connecting plug positioned in the dashboard control seat), the installation frame is inserted and adjusted in the dashboard opening.
2. Connect the plug to the control unit and insert the control unit K6 into the frame (KONVEKTA part. no.: T11-000-108).

1.2. Self-test

If the voltage supply to the control unit is interrupted, it starts a self test immediately after being reset. After ending the self test the last stored adjustment is indicated.

10. Pressure Switch

As soon as the maximum pressure at the high pressure side or the minimum pressure at the low pressure side is reached, a pressure switch shuts off the magnetic clutch. This prevents destruction of the unit. If the pressure at the compressor on the low pressure side is more than 4,5 bar the compressor pressure switch (CP) lights up an indicator lamp. This means that the compressor is not working well.

11. Manual shut-off Valve

If the refrigerant is to be collected in the condenser and the receiver; the manual shut-off valve has to be shut. This is necessary for any maintenance works on the drier, expansion valve or evaporator. The refrigerant must be removed by suction at the unit compressor.

In case of repair works at condenser or receiver, the refrigerant must be emptied and collected in a special tank. The collected refrigerant can be cleaned and re-prepared by refrigerant manufacturers.

Inspection Instruction:

1. Check high pressure switch.

In roof-top units cover the condenser with support, and let the pressure rise.
In new roof-top and integrated units disconnect the condenser blower.

Check on/off pressure values on filling armature.

2. Check low pressure switch
   Close shut off valve.
   Start unit and read point insertion on filling armature.

30. Security during Repair and Maintenance

1. During workmanship with electric short circuit danger, the battery power supply has to be disconnected.

2. During operational tests, never try to put the hand into rotating parts.

3. During work with refrigerants, the following safety precautions have to be observed completely:

   a) Working place has to be ventilated!
   b) Never expose refrigerants to burning objects!
   c) Refrigerants must not get in touch with human skin, therefore please wear protective glasses and protective gloves.
   d) Refrigerants can freeze the skin during evaporation under atmospheric pressure, avoid direct contact!
   e) If, due to carelessness, refrigerants comes into the eyes, do not rub, but rinse with plenty of water and after that consult a doctor, or medical help!
   f) Do not expose refrigerant containers to direct heat or excessive sunlight. They must not be heated up to more than 50°C!
   g) In case of direct heat absorption on refrigerant containers the intensified pressure inside the refrigerant container can open the safety valves or can, at the worst, burst the container. Therefore; never use open flames to dry the containers.
   h) When cleaning the engine of a vehicle equipped with an air conditioning unit; act very carefully because the air conditioning parts must not be exposed directly to water vapor.
   i) Never fill up refrigerant containers to the end. Filling cylinders and automatic filling stations should only be filled up to the indicated range (space factor 0,7).
   j) Before making a leakage test with dried nitrogen, it has to be checked, that all components are in regular condition.
   k) Never turn off safety switch!

Achtung: Arbeiten am Kältekreislauf dürfen nur durch qualifiziertes Fachpersonal ausgeführt werden!

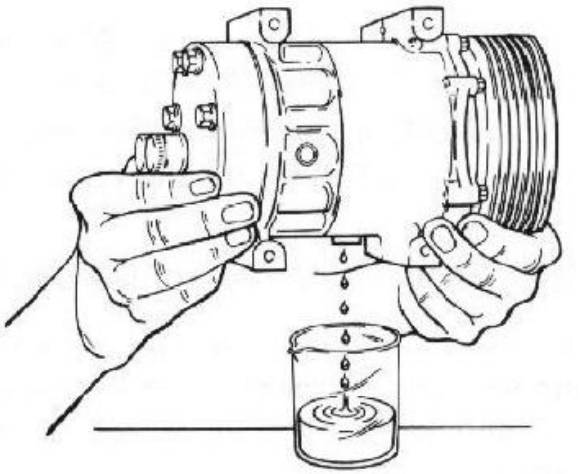
Attention: Workings on the refrigerant circuit have to be carried out by specialised staff only!

1) Befüllung mit Kältemittel.
Charge system with refrigerant.

2) Fahrzeug wie folgt vorbereiten:
Prepare the vehicle as follows:

- Türen offen / *Doors open*
- Max. Gebläseleistung / *Maximum blower speed*
- Umgebungstemperatur mindestens 24°C (75°F)
  Ambient temperature at least 24°C (75°F)

3) Betreiben Sie den Kompressor bei einer der in der nachfolgenden Tabelle angegebenen Geschwindigkeiten für 10-15 Minuten.
Run the compressor at one of the speeds listed in the table below for 10-15 minutes.



4) Während die Motorleistung aufrechterhalten wird, schalten Sie das Klimasystem und anschließend sofort den Motor aus.
While maintaining engine speed, first turn off A/C system and immediately turn off engine.

5) Entnehmen Sie das Kältemittel aus dem System.
Drain refrigerant from the system.

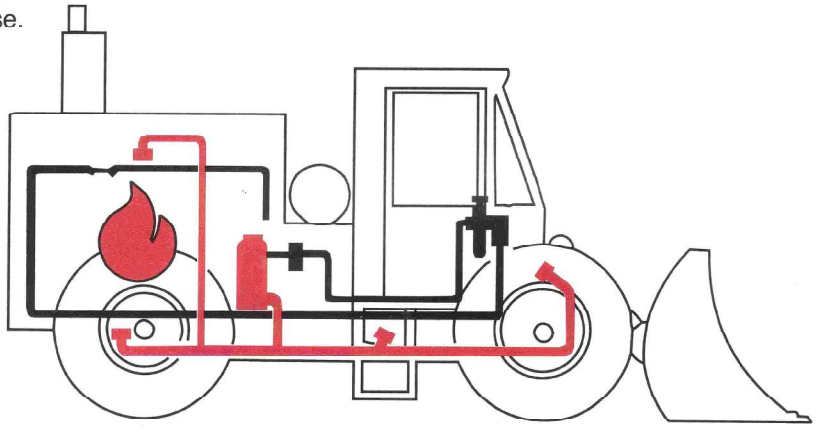
6) Bauen Sie den Kompressor aus dem Fahrzeug aus.
Remove compressor from vehicle.

7) Entfernen Sie die Ölschraube und lassen Sie alles vorhandene Öl in einen geeigneten Behälter ab.
Remove the oil plug and drain as much oil as possible into a suitable container.

8) Lassen Sie das Öl aus den Ansaug- und Einfüllöffnungen in einen geeigneten Behälter ab, indem Sie im Uhrzeigersinn an der Rückhaltemutter mit einem Schraubendreher drehen.
Drain the oil from the suction and discharge ports into a suitable container by turning the retaining nut clockwise with a screw driver.

9) Messen und notieren Sie die Menge des abgelassenen Öls.
Measure and record the volume of oil drained from the compressor.

4. Expellant gas pressure "fluidizes" the dry chemical extinguishing agent and propels it through the distribution hose.



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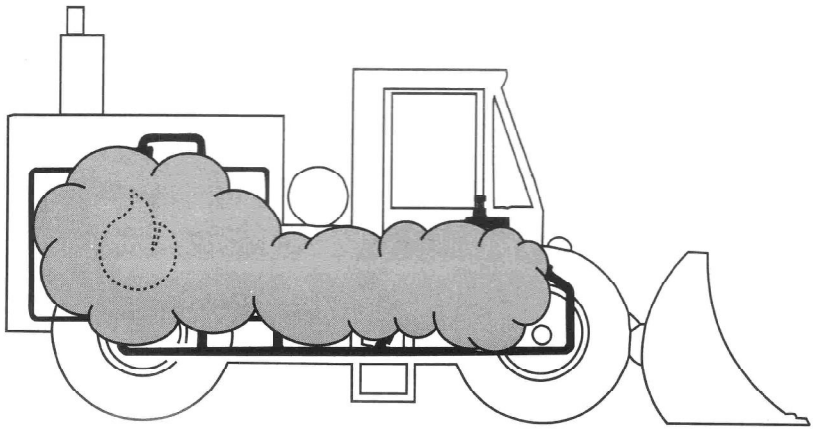
5. Dry chemical extinguishing agent is discharged through fixed nozzles into protected areas, to suppress the fire.



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Optional LVS (Twin Agent) Fire Suppression System

Along with dry chemical fire suppression system protection, some vehicles, because of their size, require an additional type of system. This type of system is called a twin agent system. An ANSUL LVS, Liquid Agent System, is designed to discharge wet chemical into the protected hazard areas simultaneously with the dry chemical discharge. The addition of the wet chemical produces a cooling effect onto the flammable fuel and the surrounding surface areas. The wet chemical can flow into hard to reach areas where fuels may have flowed into.

HAZARD ANALYSIS

This section deals with analyzing your fire protection needs and deciding where to place system components to provide the protection you need. Knowledge of the LT-A-101-50/125/250 capabilities is required and is dealt with in this manual. Knowledge of the fire hazards that exist in the equipment to be protected is also required. This will be obtained through the investigation described below. Finally, a good understanding of federal and local fire protection codes and standards is necessary. No one should begin designing without previously becoming familiar with the applicable codes.

Having read about the LT-A-101 system and the basic terminology and operation of the system, you should now begin to identity the fire hazards in the equipment to be protected. Every foreseeable hazard must be identified now while you have design flexibility; once the system is installed, adding protection for another hazard becomes more difficult. Note that the LT-A-101 system is designed only for the protection of specified equipment for the foreseeable hazards that exist due to that equipment and its operation. The areas of protection are fixed at installation and are limited in number. **An LT-A-101 system does not remove the need for a hand portable fire extinguisher on the equipment.** Fuel spills, welding (repair) heat or other unforeseeable causes may result in fires in areas not having LT-A-101 protection. The LT-A-101 system protects the areas with high likelihood of fire and potential for high damage; seldom would an LT-A-101 system be designed to protect every square inch of the equipment to be protected.

An effective system design is based on a thorough hazard analysis. Fire is made up of heat, fuel, and oxygen. A fire hazard is any place that these three elements could be brought together or where fire can propagate to, due to the design of the vehicle and the nature of the burning liquids. Because oxygen is always present, identifying fuel and heat sources is most critical.

Large excavators must be considered special type hazards. Some may require twin-agent protection. See the Appendix Section for design information or contact ANSUL Application Engineering Department.

Operator safety is also a concern when designing a fire suppression system. The operator must have enough time to safely exit off the vehicle. In some situations, an extended discharge dry chemical system may offer the operator the additional time he needs to get away from the burning vehicle. Consider egress time when designing the final system.

Some common fuel sources in vehicles include flammable liquids and greases, rubber, plastics, upholstery, and environmental debris such as wood chips or coal dust.

Common vehicle heat sources are engine blocks, exhaust systems, pumps, and turbochargers, as well as bearings, gears, brakes, and electrical equipment. A potential hazard exists when a fuel comes in contact with any heat source.

Where there is dripping or leaking fuel, the hazard can become even more dangerous than initially considered. Consulting with experienced operators or owners of similar equipment can help to identify locations of previous fires and special hazards not normally considered as common hazards.

Note: In hazard areas where vehicle components normally operate with outer skin temperatures that exceed 800 °F (427 °C), a twin agent system utilizing dry chemical agent for quick fire knockdown, and LVS liquid agent (see LVS manual, Part No.

The following are examples of typical vehicle fire hazards that require consideration:

Engine Compartment – (Turbochargers, exhaust manifolds, etc.) The engine compartment contains an assortment of fluids, fuels, oils, and greases, as well as congested wires, hoses, and accumulated debris, all very near high heat sources.

Battery Compartments – Battery compartments are a potential fire hazard when combustible materials build up on the top of the battery. These materials, in the presents of moisture, can cause a short circuit.

Transmissions, Torque Converters, and Parking Brakes – All these components are a possible high heat source that could cause ignition to combustible material.

High Pressure Hoses, Connections, Valve Banks, Control Valves – Hot fluid spraying from a ruptured high pressure hose, or leaking from a loose flange or fitting could find its way to a source of ignition.

Belly Pan – The belly pan can accumulate not only leaking fuel from the vehicle, but external debris, and because of its unique location, a fire starting in the belly pan could quickly engulf the entire vehicle.

Swing Gear and Articulation Areas – These areas can contain numerous high pressure hydraulic hoses. In these areas, the hose can wear and/or be pinched, causing high pressure flammable liquid to spray into potential high heat areas.

Hydraulic/Fuel Pumps – Because of the high pressures involved with these pumps, fluid spraying from a leaking pump could find its way to a heat source and cause ignition.

After completing the hazard analysis, determine nozzle coverages.

Note: Fires occasionally occur in the operator's compartment (cab area) due to electrical shorts or other causes. Fires in this area will need to be suppressed using hand portable fire extinguishers.

INSTALLING THE COMPONENTS (Continued)

Installing Manual Actuators (Continued)

3. Rotate actuator body for desired location of actuation hose outlet connection. Screw locknut firmly onto actuator body and insert ring pin. Apply a non-permanent thread adhesive, such as Locktite 242 or equal, to the RED actuator button threads and then screw button onto the stem. See Figure 8.

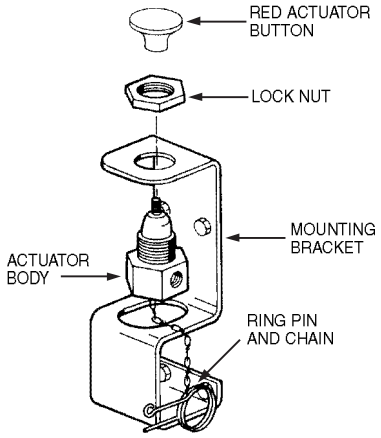

FIGURE 8
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4. Affix the appropriate operating nameplate adjacent to the manual actuator so that it is visible to attending personnel. See Figure 9.

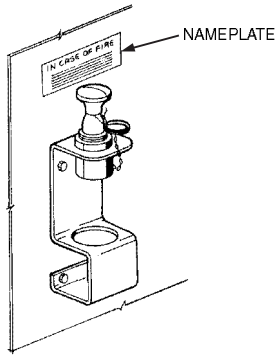

FIGURE 9
000486

5. Make certain ring pin is inserted through the RED actuator button to ensure safe cartridge installation. See Figure 10.
6. Seal ring pin to actuator stem with visual inspection seal, Part No. 197. Make certain visual inspection seal is looped through ring pin and around actuator stem. Do not wrap seal around the boot cover. See Figure 10. DO NOT INSTALL CARTRIDGE AT THIS TIME.

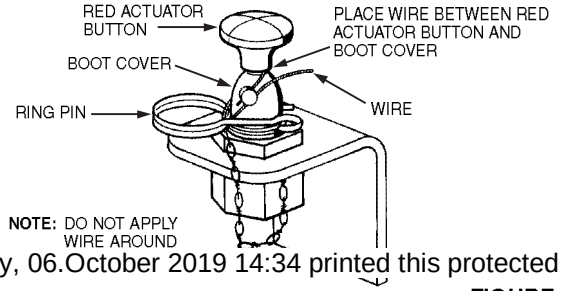

FIGURE 10
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REMOTE MANUAL ACTUATOR MOUNTED IN DASHBOARD

1. Punch or drill a 1 5/16 in. (33.3 mm) diameter hole for mounting the actuator body. See Figure 11. Make certain there is enough room under the dash for the actuator body, cartridge, and the 1/4 actuation hose connection.

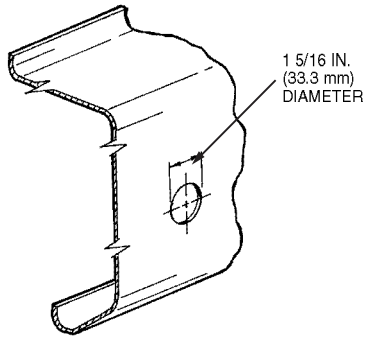


FIGURE 11
003511

2. Unscrew RED actuator button from actuator stem, remove locknut, and slide actuator body through mounting hole. See Figure 12.
3. Rotate actuator body for desired location of actuation hose outlet connection. Screw locknut firmly onto actuator body and insert ring pin. Apply a non-permanent thread adhesive, such as Locktite 242 or equal, to the RED actuator button threads and then screw the button onto the stem. See Figure 12.

NOTICE

The ring pin chain may not be long enough in certain dashboard mounted locations. When this occurs, remove the chain from the drive pin in actuator body and attach it to an appropriate location using either a pop rivet or a sheet metal screw. See Figure 12.

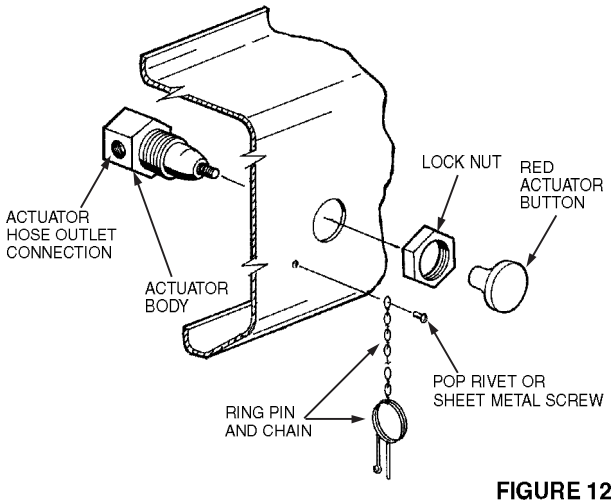


FIGURE 12
003517

4. Affix the appropriate operating nameplate adjacent to the manual actuator and visible for attending operator. See Figure 13.
5. Make certain ring pin is inserted through the RED actuator button to ensure safe cartridge installation. See Figure 13.

TOTAL SYSTEM DESCRIPTION

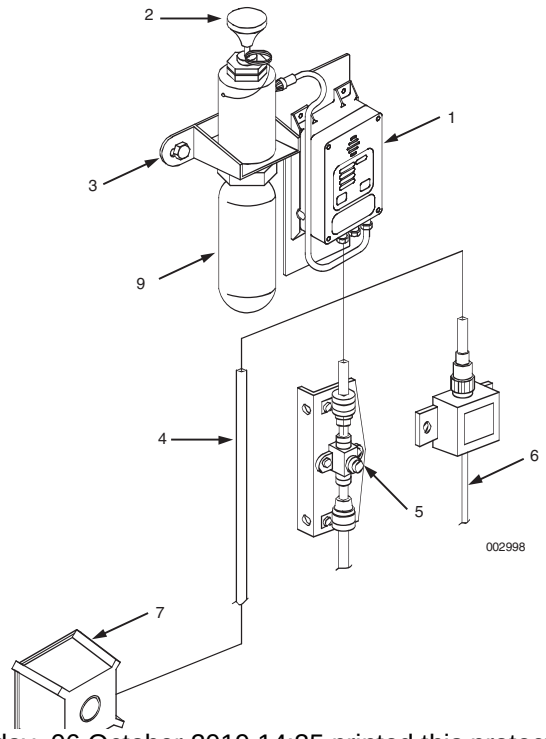
The complete CHECKFIRE SC-N system is composed of components which are combined to provide automatic fire detection and actuation for equipment hazard areas. The electric detection and actuation system is designed for use only with ANSUL fire suppression systems requiring pneumatic input as a means of actuation. In addition to the mechanical pneumatic means of operating the suppression system, the CHECKFIRE SC-N also provides an automatic and manual electric means to perform the same function.

The CHECKFIRE SC-N system is typically used with an ANSUL A-101 Vehicle Fire Suppression system for 24-hour protection of equipment. The system is particularly suited for the protection of equipment that is subjected to extreme environmental and physical conditions such as vehicles used in forestry, mining, agriculture, construction, public transportation, public utilities, land fill, and waste disposal.

Some of its features include linear (wire) and/or spot (thermal), flame detection, supervised circuitry, internally powered, adjustable shutdown and discharge time delays, auxiliary relays, and one-button operation.

CHECKFIRE SC-N Electric Detection and Actuation System consists of the following components:

1. Control Module
2. Manual/Automatic Actuator
3. Mounting Bracket
4. Detection Wire
5. Thermal Detectors
6. Pneumatic/Linear Detection
7. Triple IR (IR^3) Flame Detector
8. ▸ Protracting Actuation Device 'PAD' (not shown)
9. LT-10-R Cartridge
10. Check Valve (not shown)
11. Remote High Level Alarm (not shown)
12. ▸ Release Circuit Test Module (not shown)



The control module can be used as a self contained system, powered by its own internal lithium battery. This allows the detection system to operate around-the-clock without use of external power. Optionally, external power can be connected to the control module with the internal power also connected, which results in a system with battery back-up. When connected to an external 12/24 VDC supply with the internal battery also connected, the external power source becomes the primary supply, while the internal power source is maintained in a stand-by mode of operation.

The control module may be installed where the ambient temperature is between –40 °F to 140 °F (–40 °C to 60 °C).

The CHECKFIRE SC-N Detection and Actuation System is ▸ Approved by FM Approvals.

Circuits

The first initiating circuit is the supervised detection circuit designed to be connected to linear (wire) and/or spot type thermal detectors that provide a contact closure input to initiate a fire detected condition. The second initiating circuit is designed to accept a contact closure type of actuating device such as an electric manual pull station or a pressure switch. The initiating circuits are low impedance and designed to eliminate nuisance alarms associated with contact bounce.

Two field programmable time delays provide timing of shutdown and release functions associated with the operation of the detection and electric manual pull/ pressure switch initiation circuits.

1) DETECTION INITIATING CIRCUIT

   The detection circuit consists of two time delays:

   The first time delay is field programmed to assign the time between alarm (initiation of the detection circuit) and the operation of the shutdown relay. The first time delay is field programmable for 5, 10, 20, or 30 seconds.

   The second time delay is field programmed to assign the time between the completion of the first time delay (when the shutdown relay operates) and the operation of the release circuit. The second time delay is field programmable for 0, 10, 20, or 30 seconds.

2) ELECTRIC MANUAL PULL/PRESSURE SWITCH FEEDBACK INITIATING CIRCUIT

   The second initiating circuit is field programmable to be used as either an electric manual pull or pressure switch feedback circuit. If selected as an electric manual pull circuit, its operation will override the first time delay function and initiate a second time delay condition, causing the shutdown relay to immediately operate and system release to occur upon completion of the second time delay. Additionally, the control module can be field programmed to shorten the second time delay when a manual actuation occurs. The time delay options available with the electric manual actuation are 0, 10, 20, and 30 seconds, with the condition that it can only be less than or equal to the programmed time delay of the detection circuit.

   Selection of the second initiating circuit as a pressure switch feedback circuit will result in the operation of the alarm relay and shutdown relay immediately upon receiving the signal. The release circuit will not be initiated from this feedback circuit because the system will already have been pneumatically actuated from the manual pneumatic actuator.

   When this initiating circuit has operated, the Alarm and Release LEDs, along with the audio sounder, will pulse until the pressure switch is reset and then the control panel is reset.

FUNCTION TEST (Continued)

Detection Circuit Functional Test (Continued)

The following will take place while the jumper wire is being held on the terminals:

- The RED Alarm LED and sounder will pulse at a rate of two times per second
- The first time delay cycle will start
- The alarm relay will transfer (non-latching)

After verifying the above, remove the jumper wire. The control module will reset to normal (as long as the cycle for Time Delay No. 1 has not been exceeded). Normal is when only the GREEN Power LED is pulsing and no other LEDs or the Audio Alarm are operating. Also, the alarm relay will return to normal.

2. This next test will verify the settings of the time delays. Again, hold the jumper wire on Terminals 3 and 4. Continue to hold the jumper wire on these terminals until the second time delay has started. Once the second time delay has started, the jumper wire can be removed.

   The following will take place while the jumper wire is being held on the terminals:

   - The RED Alarm LED and sounder will pulse at a rate of two times per second
   - The first time delay cycle will start and time through its cycle
   - The alarm relay will transfer (non-latching)

   After the first time delay has completed its cycle, the following will take place:

   - The RED Alarm LED and sounder will pulse at a rate of four times per second
   - The second time delay cycle will start and time through its cycle
   - The alarm relay will transfer
   - The shut-down relay will transfer, causing vehicle shutdown
   - At the end of the second time delay cycle, the release circuit will activate, causing the GREEN LED on the test module to illuminate.

3. After the jumper wire has been removed, reset test module by pressing the reset button on the tester.
4. Disconnect the actuation cable from the test module and verify that the module is indicating both a RED alarm LED and a YELLOW release fault LED.
5. Reconnect the actuation cable to the test module and push the “RESET” button on the CHECKFIRE SC-N control module. The module will return to the normal condition.
6. If required, make certain to reset any auxiliary shutdown devices.

Pressure Switch/Manual Pull Initiating Circuit

During the programming requirements of the pressure switch/manual pull circuit, two options are available. The first option allows the circuit to be programmed for immediate release and the second option allows for shutdown/time delay/release. If choosing the shutdown/time delay/release option, the programming will also require a length of time delay to be chosen.

When performing this functional test, it is necessary to know whether the first or second option was programmed into the

Immediate Release Option

1. Using the jumper wire, hold the wire on Terminals 5 and 6. This is the pull station circuit. If the circuit was programmed for immediate release, the following will take place:
   - The RED Alarm LED and the sounder will pulse at a rate of four times per second
   - The alarm relay will transfer
   - The shutdown relay will transfer
   - The release circuit will activate, causing the GREEN LED on the test module to illuminate
2. Reset test module by pressing the reset button on the tester. **Do not disconnect the test module at this time.**
3. Push the “RESET” button on the CHECKFIRE SC-N Control Module and the module will return to the normal condition.
4. If required, make certain to reset any auxiliary shutdown devices.

Shutdown/Time Delay/Release Option

1. Using the jumper wire, hold the wire on Terminals 5 and 6. This is the pull station circuit. If the circuit was programmed for shutdown/time delay/release, the following will take place:
   - The RED Alarm LED and sounder will pulse at a rate of four times per second
   - The alarm relay will operate immediately (transfer)
   - The shutdown relay will operate immediately (transfer)
   - A single time delay cycle will start (during test, verify length of delay)

   After the single time delay cycle is completed, the release circuit will actuate, causing the GREEN LED on the test module to illuminate.
2. Reset squib test module by pressing the reset button on the tester. **Do not disconnect the test module at this time.**
3. Push the “RESET” button on the CHECKFIRE SC-N Control Module and the module will return to the normal condition.
4. If required, make certain to reset any auxiliary shutdown devices.

Pressure Switch Option

1. Using the jumper wire, hold the wire on Terminals 5 and 6. This is the pressure switch circuit. The following will take place:
   - The alarm relay will transfer
   - The shutdown relay will transfer
   - The RED alarm LED and the sounder will pulse at a rate of four times per second.
2. Push the “RESET” button on the CHECKFIRE SC-N Control Module and the module will return to the normal condition.
3. If required, make certain to reset any auxiliary shutdown devices.

DETECTION WIRE FLUID RESISTANCE CAPABILITY

Resistance Rating Key:

G = GOOD

L = LIMITED

C = CONDITIONAL (Service conditions must be outlined to ANSUL for approval of wire suitability for applications.)

U = UNACCEPTABLE (Not to be used)

Agent	Rating
Acetate Solvents, Crude	U
Acetate Solvents, Pure	U
Acetic Acid, Dilute (20%)	U
Acetic Acid, Glacial	U
Acetone	U
Air	G
Alcohols	C
Aluminum Chloride	G
Aluminum Fluoride	G
Aluminum Sulfate	G
Ammonia Liquid (Anhydrous)	U
Ammonia, Chloride	G
Ammonium Hydroxide	L
Ammonium Nitrate	G
Ammonium Phosphate	G
Ammonium Sulfate	G
Amyl Acetate	U
Amyl Alcohol	L
Asphalt	C
Barium Chloride	G
Barium Hydroxide	G
Barium Sulfide	G
Benzene, Benzol	C
Benzene (Petroleum Ether)	C
Benzene (Petroleum Naphtha)	C
Borax	L
Boric Acid	L
Bromine	U
Butyl Acetate	U
Butyl Alcohol, Butanol	L
Calcium Bisulfite	L
Calcium Chloride	G
Calcium Hydroxide	G
Calcium Hypochlorite	L
Carbolic Acid Phenol	C
Carbon Dioxide	G
Carbon Disulfide	U
Carbon Monoxide, Hot	U
Carbon Tetrachloride	L
Carbonic Acid	G
Castor Oil	C
Chlorinated Solvents	C
Chlorine, Dry	U
Chlorine, Wet	U
Chloroacetic Acid	U
Chloroform	U
Chlorosulphonic Acid	U
Chromic Acid	U
Citric Acid	L
Copper Chloride	G
Copper (II) Sulfate	G
Creosote	U
Diesel Oil, Light	L
Ethers	U
Ethyl Acetate	U
Ethyl Alcohol	C
Ethyl Chloride	U
Ethylene Dichloride	U
Ethylene Glycol	L
Ferric Chloride	G
Ferric Sulfate	G
Ferrous Salt Solutions	G
Formaldehyde	L
Formic Acid	L
Fuel Oil	L
Furfural	U
Gasoline	C
Glycerine, Glycerol	L
Grease, Petro	L
Heptane	C
Hexane	L
Hydraulic Fluids & Lubricating Oils, Straight Petroleum Base	L
Water and Petroleum Oil Emulsion (FR)	L
Water and Glycol Solution	L
Straight Phosphate–Ester (FR)	L
Silicone Oils	L
Hydrobromic Acid	U
Hydrochloric Acid, Cold	C
Hydrochloric Acid, Hot	U
Hydrocyanic Acid	C
Hydrofluoric Acid, Cold	C
Hydrofluoric Acid, Hot	C
Hydrogen Peroxide (Dilute)	G
Hydrogen Peroxide (Concentrated)	C
Hydrogen Sulfide	C
Kerosene	L
Lacquer Solvents	U
Lactic Acid	C
Linseed Oil	L
Magnesium Chloride	G
Magnesium Hydroxide	G
Magnesium Sulfate	G
Mercuric Chloride	U
Mercury	L
Methyl Alcohol, Methanol	L
Methyl Chloride	U
Methyl Ethyl Ketone	U
Methyl Isopropyl-Keytone	U
Mineral Oil	L
Naphtha	C
Naphthalene	U
Nickel Chloride	G
Nickel Sulfate	G
Nitric Acid, 10%	L
Nitric Acid, 70%	U
Nitrobenzene	U
Oleic Acid	C
Oleum Spirits	U
Perchlorethylene	C
Picric Acid, Molten	U
Picric Acid, Solution	U
Potassium Chloride	G
Potassium Cyanide	G
Potassium Hydroxide	C
Potassium Sulfate	G
Soda Ash Sodium Carbonate	G
Sodium Bisulfate	G
Sodium Chloride	G
Sodium Cyanide	G
Sodium Hydroxide	C
Sodium Hypochorite	C
Sodium Nitrate	G
Sodium Peroxide	C
Sodium Phosphate	G
Sodium Silicate	G
Sodium Sulfate	G
Sodium Sulfide	C
Sodium Thiosulfate, “Hypo”	G
Soybean Oil	L
Stannic Chloride	G
Stearic Acid	L
Sulfur Dioxide	C
Sulfur Trioxide	C
Sulfuric Acid, 10%, Cold	L
Sulfuric Acid, 10%, Hot	L
Sulfuric Acid, 75%, Cold	L
Sulfuric Acid, 75%, Hot	L
Sulfuric Acid, 95%, Cold	U
Sulfuric Acid, 95%, Hot	U
Sulfuric Acid, Fuming	U
Sulfurous Acid	L
Tannic Acid	G
Tartaric Acid	G
Toluene	U
Trichloroethylene	U
Turpentine	L
Varnish	U
Xylene	U
Zinc Chloride	L
Zinc Sulfate	G

DISTRIBUTION SYSTEM REQUIREMENTS (Continued)

JIC Hose Fittings and 150 lb. Fittings

JIC hose fittings meeting Hydraulic Hose Fitting Standard J516 can be used in most applications. When using JIC hose fittings as elbows, use only elbows that have a radiused bend. 150 lb NPT elbows and tees can also be used to assemble hose or pipe and attach hose or pipe to the discharge nozzles. Make certain that all elbows used in the agent distribution line, are of the same type (i.e., either all JIC or all 150 lb NPT elbows). Refer to the Installation Section for maximum and minimum elbow requirements.

Note: When figuring the maximum and minimum amount of elbows in the A-101/LT-A-101 system, two (2) 45 ° fittings can be counted as one 90° fitting.

Heat Resistant Fire Jacket for Hydraulic Hose (Non-FM Approved)

All hose assemblies, including actuation lines, expellant gas lines, and agent distribution hose that will be normally exposed to or located in areas with temperatures exceeding 200 °F (93 °C), should be sleeved with an extreme temperature heat-resistant fire jacket. (Do not route actuation hose through fire hazard areas. If this cannot be avoided, the hose must be fire jacketed.) Information concerning fire jacketing should be available through your local hose supplier. If not, Bentley Harris manufacturers a fire jacket that will withstand continuous operating temperatures from –65 °F to 500 °F (–54 °C to 260 °C) and short term exposures up to 2000 °F (1093 °C). For a listing of distributors in your area, call Bentley Harris at either 610-363-2600 or, 800-321-2295.

Dry Chemical Flow Characteristics

The assembly of piping (hose) for a dry chemical system probably lends itself to the greatest chance for error when installing the system. Dry chemical-gas mixtures do not flow like liquids, and, as a result, certain basic rules must be followed to assure correct dry chemical distribution to the nozzles.

In order to obtain equal distribution at a tee, the dry chemical must enter the center opening (bull) of the tee and exist the two side opening which are 180° apart. See Figure 2.

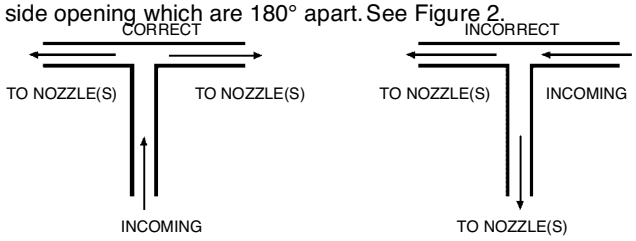


FIGURE 2
003477

When dry chemical makes a change of direction through an elbow, a tee, or a hose bend, a separation of the dry chemical and gas mixture occurs. If a tee follows this change of direction where separation can occur, and if this tee lies in the same plane as the change in direction through an elbow, tee, or hose bend, more dry chemical will discharge through one of the tee outlets and more gas will discharge out the other tee outlet. A certain minimum length of hose must be allowed from the bend (elbow) to the tee or from the first tee to the second tee in order to permit the dry chemical and gas to intermix before striking the tee. The minimum length required is equal to 20 hose diameters. 18 in. (457 mm) is required for 7/8 in. hose, 15 in. (381 mm) is required for 3/4 in. hose, and 10 in. (254 mm) is required for 1/2 in. hose.

Note: When using the distribution tee, Part No. 25031, a minimum length of 15 in. (381 mm) of 3/4 in. or 18 in. (457 mm) of 7/8 in. hose, will always be required between any bend or elbow and the distribution fee.

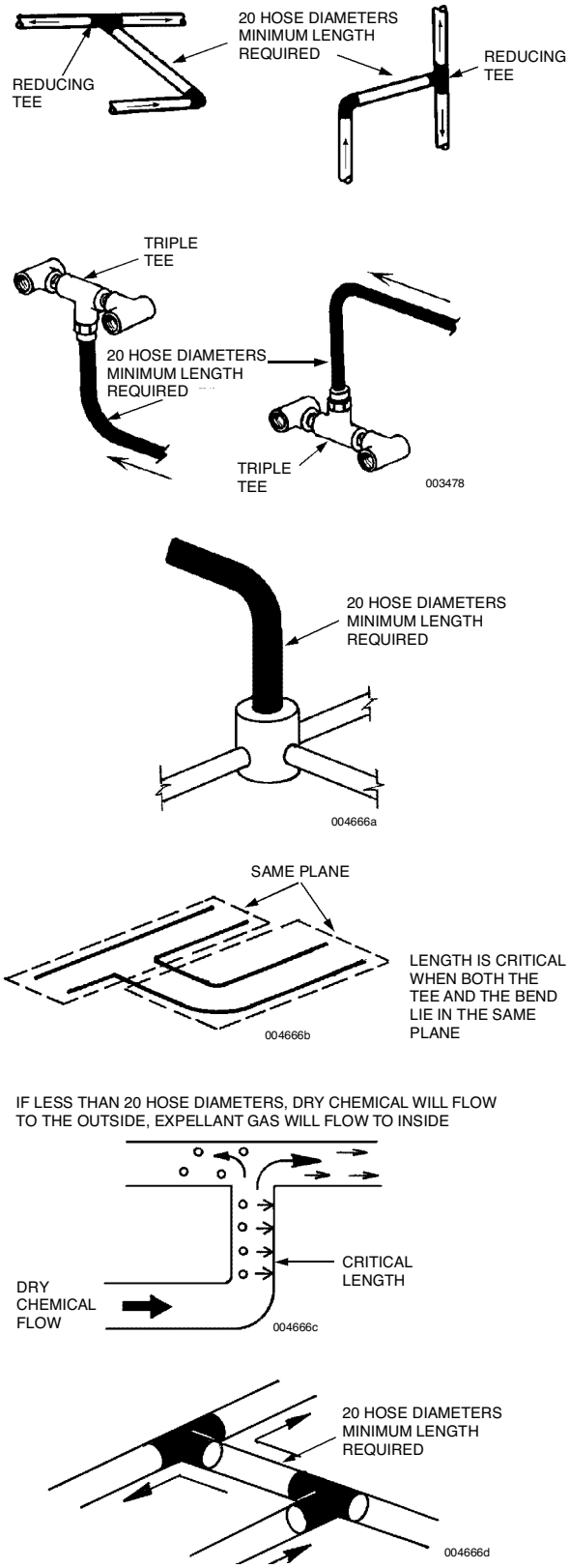


FIGURE 3

INSTALLING THE COMPONENTS (Continued)

Installing Manual Actuators (Continued)

REMOTE MANUAL ACTUATOR WITH "L" BRACKET

NOTICE

Actuator must be installed in a way that will provide protection for the exposed cartridge from physical damage.

1. If not already done, weld or bolt mounting bracket to the selected surface. If welding, to avoid corrosion, paint welded surface. See Figure 4.

NOTICE

Where bolting the mounting bracket is performed, use 3/8 in. (corrosion-resistant) bolts of appropriate length with lockwashers and nuts.

2. Unscrew the RED actuator button from the actuator stem and slide actuator body through mounting hole on bracket.
3. Rotate actuator body for desired location of actuation hose outlet connection. Screw locknut firmly onto actuator body and insert ring pin. Apply a non-permanent thread adhesive, such as Locktite 242 or equal, to the RED actuator button threads and then screw button onto the stem.
4. Affix the appropriate operating nameplate adjacent to the manual actuator so that it is visible to attending personnel.
5. Make certain ring pin is inserted through the RED actuator button to ensure safe cartridge installation.
6. Seal ring pin to actuator stem with visual inspection seal, Part No. 197. Make certain visual inspection seal is looped through ring pin and around actuator stem. Do not wrap seal around the boot cover. See Figure 9. DO NOT INSTALL CARTRIDGE AT THIS TIME.

REMOTE MANUAL ACTUATOR WITH CARTRIDGE GUARD

1. Remove back box from actuator assembly.
2. If not already done, weld or bolt back enclosure to the selected surface. If welding, to avoid corrosion, paint welded surface. See Figure 4.

NOTICE

Where bolting the back enclosure is performed, use 3/8 in. (corrosion-resistant) bolts of appropriate length with lockwashers and nuts.

INSTALLING THE DISTRIBUTION NETWORK

General Requirements

Refer to the system layout sketch completed in the Design Section IV. Make certain all hose lengths do not exceed the maximum allowed.

When installing the distribution hose, once again remember the following:

1. Make certain the proper type and size of hose is used.
2. In order to obtain equal distribution at a tee, the center opening must be used as an inlet and the opposing openings used as outlets.
3. When any 90° bend or elbow is located in the distribution hoseline preceding a tee, a minimum length of 20 hose diameters is required between the 90° bend and the tee. This length of hose is called a "critical length" and exists only when the 90° bend and the tee lie in the same plane.
4. The use of street elbows is not allowed.
5. Per SAE J1273, "Care must be taken to insure that fluid and ambient temperatures, both static and transient, do not exceed the limitations of the hose. Special care must be taken when routing near hot manifolds."
6. Use of 90° elbows is allowed if the following requirements are not exceeded:
   - — Maximum of 4 elbows from the agent tank to any nozzle
   - — Maximum of 2 elbows in a primary branch line
   - — Maximum of 2 elbows in a secondary branchline
   - — Minimum of 1 elbow from agent tank to a nozzle
7. When bends are formed in the distribution hose, the following minimum bend radius must not be exceeded:

Hose Size	100RI	100R5
1/4 in.	4 in.	3 in.
1/2 in.	7 in.	5 1/2 in.
3/4 in.	9 1/2 in.	—
7/8 in.	11 in.	7 3/8 in.

Note: Minimum bend radius measured to inside of hose radius.

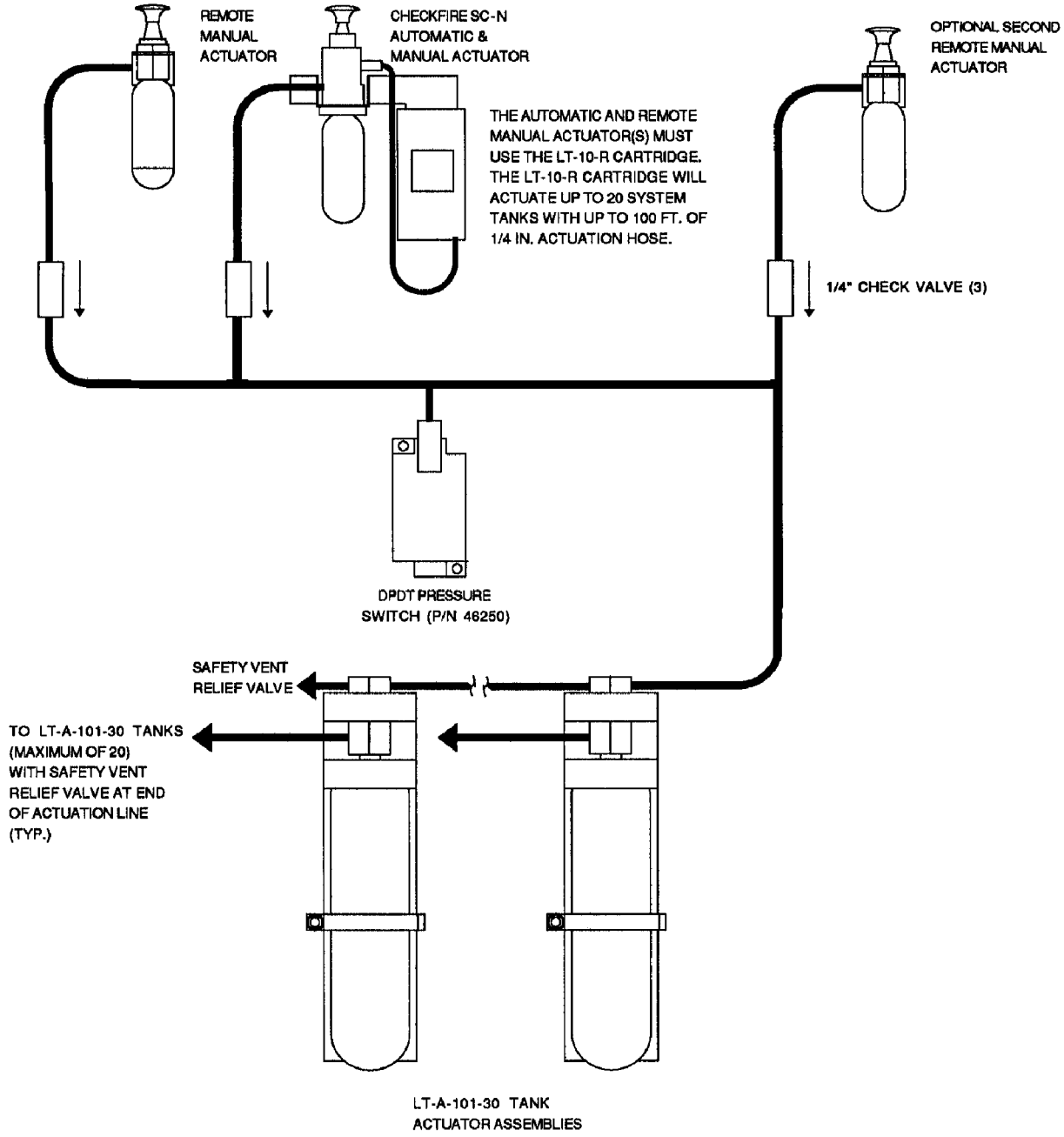
Distribution Hose Installation

1. Starting at the tank outlet, connect the distribution hose from the bursting disc union to the triple, distribution, or reducing tee. Make certain hose is routed in an ordering manner and avoid routing hose through fire hazard areas if possible.
2. After hose has been connected, tighten bursting disc union.
3. Follow the sketch (completed in Hazard Analysis portion of Design Section IV) and complete all hose branch line runs.
4. When connecting the hose to each nozzle, make certain the aiming angle of each nozzle is not disturbed.
5. When routing hose through bulkheads, take precautions to protect the hose from excessive wear due to constant vehicle vibration.
6. When all distribution hose has been routed, make certain all fittings are wrench tightened.
7. Finally, clamp the discharge hose securely at least every five feet using industrial duty cable ties or conduit clamps.
8. When passing through bulkheads or grates, Schedule 40 nipples up to 6 in. in length may be used in the distribution line. (Refer to NFPA17, Section 2-5 (Pipe and Fittings)).

Note: 3/4 in. and 1/2 in. Quik-Seal Adapters may be used.

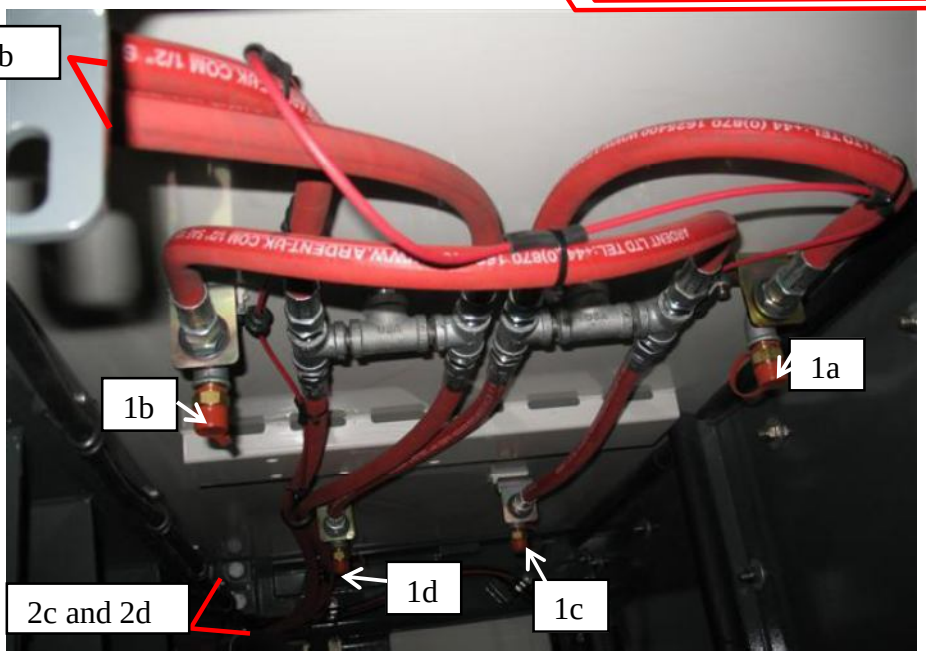
LARGE EXCAVATORS (Continued)

Design Parameters (Continued)



1/4" ACTUATION HOSE DETAIL FOR A-101 EXTENDED DISCHARGE SYSTEM
(Not FMRC Approved)

FIGURE 2
003527


2a and 2b
1a
1b
1d
1c
2c and 2d

Anzahl der Schmierpunkten Number of greasing points Nombre de points de graissage Cantidad de punto	Eingebauten Schmierelementen Mounted greasing parts Elements de graissage installés Elementos de engrase	fuer 1 Zyklus / for 1 cycle / pour 1 cycle / per 1 ciclo cm3 / Punkt cm3 / Point cm3 / Point cm3 / Punto	cm3 / Total cm3 / Total cm3 / Total cm3 / Total	Umdrehungen fuer den Fett Injektor Rotation number for the grease injector Nbre de tours pour l'injecteur de graisse Vueltas de la grasa inyector
2	1x SSV10	1,60	3,20	
2		0,40	0,80	

Total = 4 greasing points Total = 4.00 cm3

8	2x LM5 + 2x SSV12	0,83	10,00	14 => 9 mm
8		0,42		

Total = 16 greasing points Sub total #1 = 10,00 cm3

2	1x SL1 + 1x SSV6	0,07	0,13	0 => 8 mm
2	1x LM5	0,66	1,32	1 => 22 mm
2	1x LM5	0,66	1,32	1 => 22 mm
2	1x LM5	1,32	2,64	3 => 20 mm
2	1x LM5	0,66	1,32	1 => 22 mm
2	1x LM5	0,66	1,32	1 => 22 mm
2	1x LM5	1,32	2,64	3 => 20 mm
2	1x LM5	1,32	2,64	3 => 20 mm
2	1x LM5	1,32	2,64	3 => 20 mm
2	1x LM5	2,64	5,28	7 => 16 mm
2 ●	1x LM5	1,32	2,64	3 => 20 mm
2	1x LM5	0,66	1,32	1 => 22 mm
2 ●	1x LM5	1,32	2,64	3 => 20 mm
2	1x LM5	1,32	2,64	3 => 20 mm
2	1x LM5	2,64	5,28	7 => 16 mm
2	1x LM5	2,64	5,28	7 => 16 mm
2	1x LM5	2,97	5,94	8 => 15 mm
2 ●	1x LM5	1,32	2,64	3 => 20 mm
2	1x LM5	0,66	1,32	1 => 22 mm
1 #	1x LM5	2,64	2,64	7 => 16 mm
2	1x LM5	0,66	1,32	1 => 22 mm
2 ●	1x LM5	2,64	5,28	7 => 16 mm
2	1x LM5	1,98	3,96	5 => 18 mm
2 ●	1x LM5	2,64	5,28	7 => 16 mm
2	1x LM5	1,98	3,96	5 => 18 mm
2 ●	1x LM5	2,64	5,28	7 => 16 mm
2	1x LM5	1,98	3,96	5 => 18 mm
2 ●	1x LM5	2,64	5,28	7 => 16 mm
2	1x LM5	1,98	3,96	5 => 18 mm

Total = 57 greasing points Sub total #2 = 91,87 cm3

TOTAL = Sub total #1 + Sub total #2 = 101,87 cm3

TIEFFLOEFFELAUSRUESTUNG
BACKHOE EQUIPMENT
EQUIPEMENT RETRO

0,0 kg

28-Feb-2006 RUNSER M.

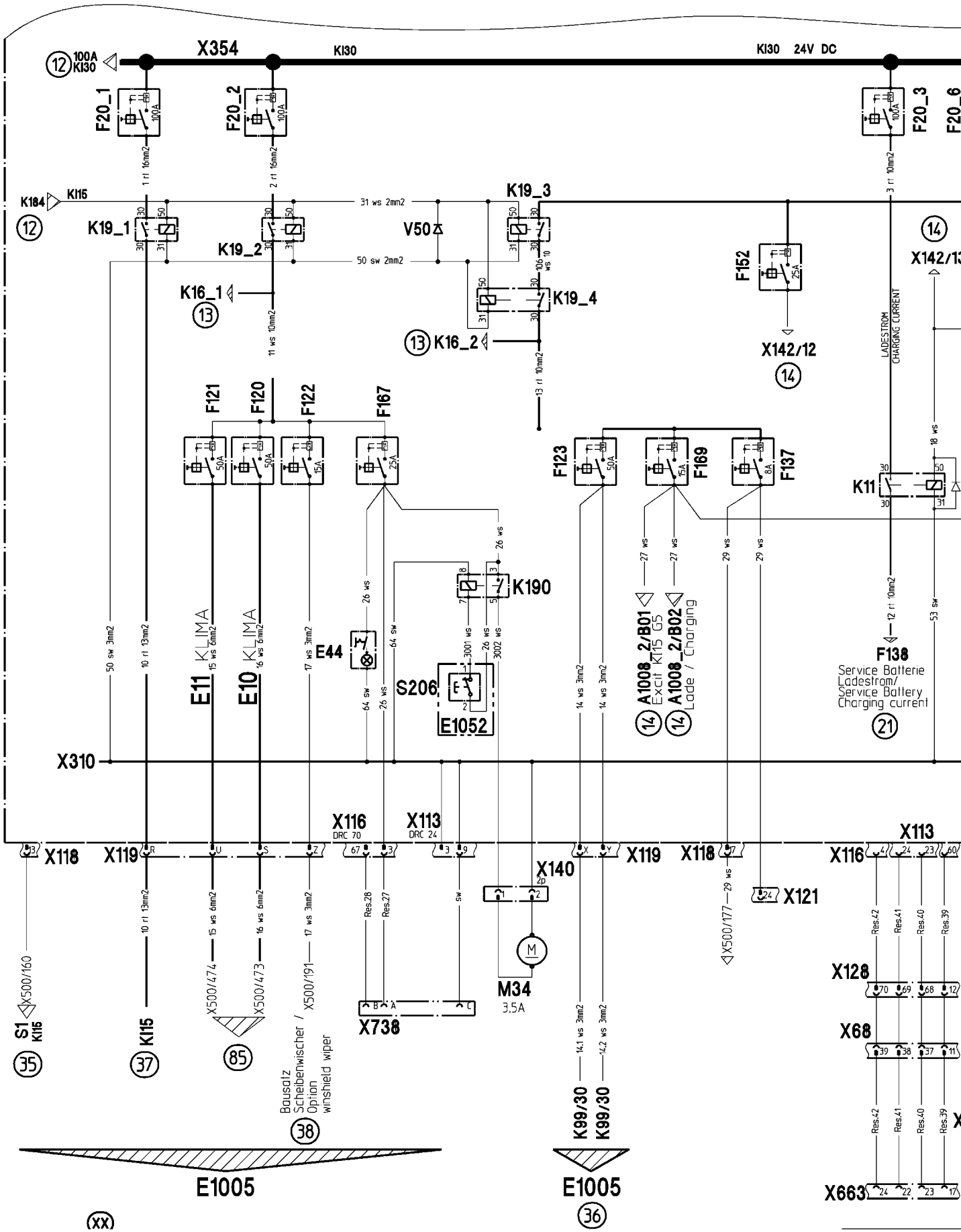
LFR 1:1

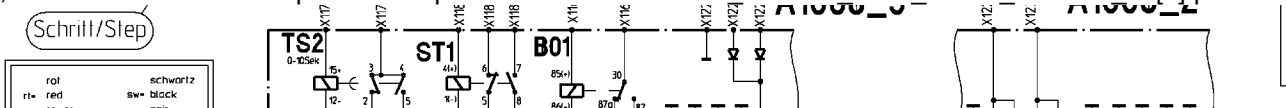
SCHMIERFETTMENGEN

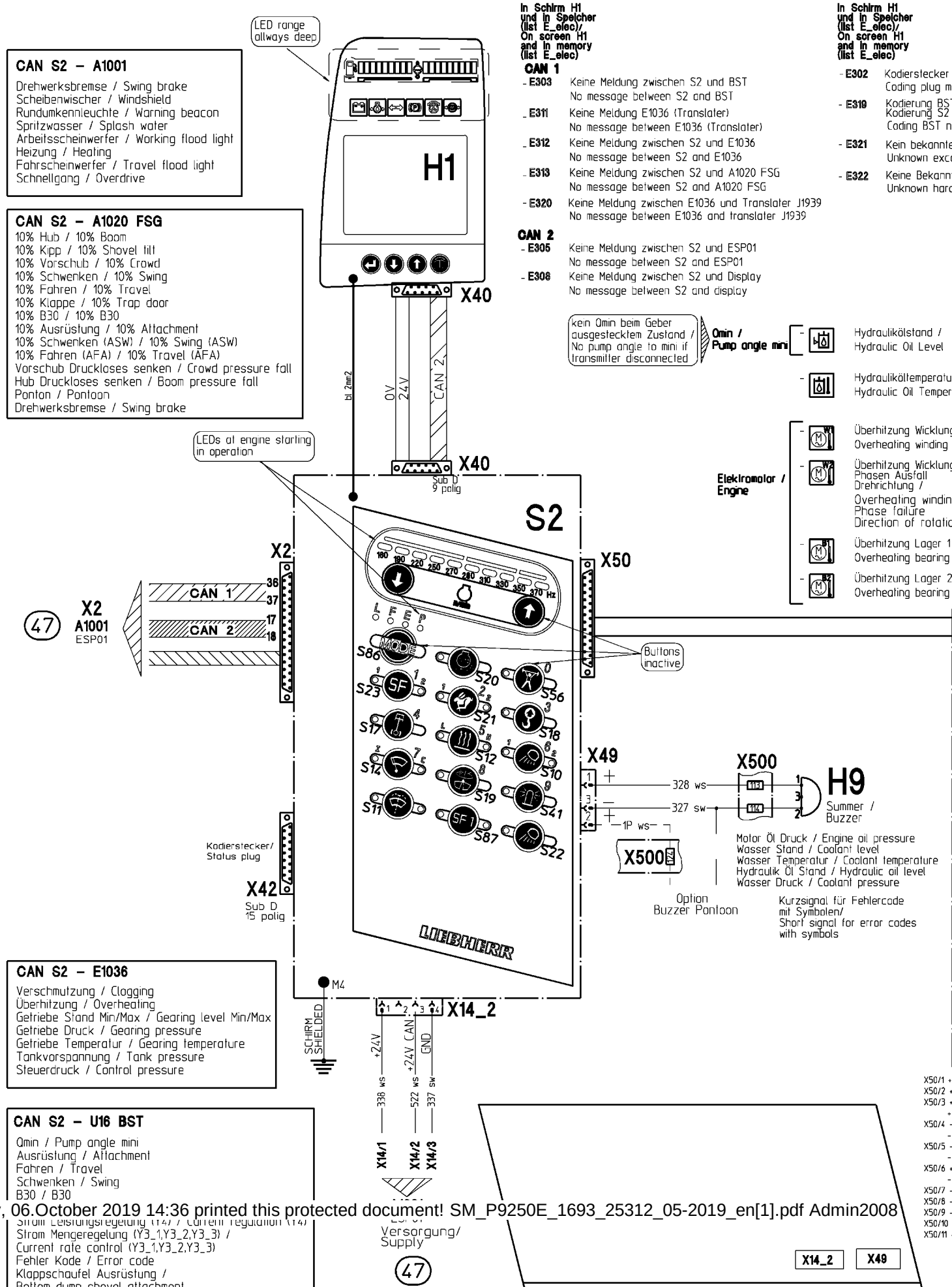
Step		
36/46/47	A1001	ESP01 Plate
38/39/54	A1008_1	Plate relay E1005
14/17	A1008_2	Plate relay E1003
78/79	A1008_4	Plate relay E1022_1
17/19/20	A1008_5	Plate relay E1022_1
75/77/80		
45	A1014	Current regulation plate
34	A1016	Interface plate
43/44	A1019	Regelation plate
36/37/42	A1020	FSG Plate
59-71/73		
57	A2	Radio
42	B14	Transmitter / Hydraulic oil level
30	B15	Transmitter / Splitterbox temperature
30	B38	Transmitter / Hydr.Tank pressure
30	B39	Transmitter / Hydr.oil level (pontoon)
56	B50_RR	Rear right speaker
56	B50_FR	Front right speaker
56	B50_RL	Rear left speaker
56	B50_FL	Front left speaker
82	B50_2	Level switch / Grease pump 2
82	B51_1	Transmitter / Grease circuit monitoring
82	B51_2	Transmitter / Grease circuit monitoring
42	B53	Transmitter / Swing engine
29	B63_1	Transmitter / Pump clogging engine
29	B63_2	Transmitter / Pump clogging engine
29	B63_3	Transmitter / Pump clogging engine
29	B63_7.1	Transmitter / Pump clogging engine
29	B63_7.2	Transmitter / Pump clogging engine
28	B64_1	Transmitter / Pump overheating engine
28	B64_2	Transmitter / Pump overheating engine
28	B64_3	Transmitter / Pump overheating engine
28	B64_7.1	Transmitter / Pump overheating engine
28	B64_7.2	Transmitter / Pump overheating engine
30	B66	Transmitter / Splitterbox level
42	B67	Transmitter / Hydraulic oil temperature
85	B69	Transmitter / Pressure switch greasing pump 1
30	B72	Transmitter / Splitterbox pressure
14	B73	Proximity switch / Hydr. valve supervision
14	B74	Proximity switch / Hydr. valve supervision
65	B76	Proximity switch / Pressureless falling
30	B84	Transmitter / Control pressure
76	B92	Temperature switch / for M10
76	B93	Temperature switch / for M11
80	B100	Proximity switch / Trap door up
80	B101	Proximity switch / Trap door locked
79	B105	Proximity switch / Principal ladder up
79	B106	Proximity switch / Principal ladder locked
70/71	B115_1	Proximity switch / Attenuation boom 1
70/71	B115_2	Proximity switch / Attenuation boom 2
70/71	B116_1	Proximity switch / Attenuation crowd 1
70/71	B116_2	Proximity switch / Attenuation crowd 2
70/71	B117_1	Proximity switch / Attenuation shovel tilt 1
70/71	B117_2	Proximity switch / Attenuation shovel tilt 2
71	B117_3	Proximity switch / Attenuation shovel tilt 3
71	B117_4	Proximity switch / Attenuation shovel tilt 4
71	B118_1	Proximity switch / Attenuation shovel flap 1
71	B118_2	Proximity switch / Attenuation shovel flap 2
71	B118_3	Proximity switch / Attenuation shovel flap 3
71	B118_4	Proximity switch / Attenuation shovel flap 4
102	B133_1	Temperature sensor / Heating aspiration
102	B133_2	Temperature sensor / Heating aspiration
102	B136	Temperature sensor / Heating splitterbox
103	B137_1	Temperature sensor / Heating hydraulic components
103	B137_2	Temperature sensor / Heating hydraulic components
103	B137_3	Temperature sensor / Heating hydraulic components
103	B137_4	Temperature sensor / Heating hydraulic components
15/102	B139	Temperature sensor / Engine starting inhibition
85A	B150_1	Transmitter / Supervision P12
85A	B150_2	Transmitter / Supervision P12
61	B166	Gradient sensor
103	B175_1	Heating pump circuit switch
103	B175_2	Heating travel engine circuit switch
103	B175_3	Heating swing engine circuit switch
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
83/84B	B187_2	Ext sensor air conditionning 2
85	C1	Camera on left side

Step		
19	E1_1	Flood light 70W/24V fuel tank
19	E1_2	Flood light 70W/24V fuel tank res
19	E1_3	Flood light 70W/24V fuel tank
19	E1_4	Flood light 70W/24V fuel tank res
19	E2_1	Flood light 70W/24V attachment
19	E2_2	Flood light 70W/24V attachment
18	E3_1	Flood light 70W/24V attachment
18	E3_2	Flood light 70W/24V attachment
18	E4_1	Flood light 70W/24V attachment re
18	E4_2	Flood light 70W/24V attachment re
18	E5_1	Flood light 70W/24V attachment re
18	E5_2	Flood light 70W/24V attachment re
20	E6_1	Flood light 70W/24V front catwalk
20	E6_2	Flood light 70W/24V front catwalk
20	E6_3	Flood light 70W/24V front catwalk
20	E6_4	Flood light 70W/24V front catwalk
38	E7	Dome light
35	E8	E1005 lightening
85	E10	Air conditioner evaporator
85	E11	Air conditioner condenser
23	E14	Cigarette lighter
23	E15_1	Service lightening 18W elevation
24	E16_1	Service lightening 18W engine
24	E16_5	Service lightening 18W batteries
24	E17_1	Service lightening 18W control va
20	E18_1	Flood light 70W/24V counterweight
20	E18_2	Flood light 70W/24V counterweight
20	E18_3	Flood light 70W/24V counterweight
20	E18_4	Flood light 70W/24V counterweight
22	E19	Flood light 70W/24V front catwalk
21	E21	Service flood light 70W top of ca
42	E22_1	Warn light travel alarm top of ca
20/41	E22_2	Warn light travel alarm counterwe
20/41	E22_3	Warn light travel alarm counterwe
78	E22_4	Warn light travel alarm ladder
54	E31	Board lightening 8W/24V
16	E44	E1003 lightening
40	E52	Emergency control
80	E57	Trap door lightening
19	E58_1	Flood light 200W/24V Top of cabin
19	E58_2	Flood light 200W/24V Top of cabin
21	E59	Service lightening 18W swing gear
10-24/38-42	E1003	Power connection box
52/75/80-84		
18-20/38-45	E1005	Cabin connection box
51/54		
56/58/59-71/82/83/84		
83/84/84B	E1006	Electric box air conditionning
78/79	E1022_1	Connection box principal ladder c
80	E1022_2	Connection box trap door control
82	E1029	Connection box hand spray
82	E1031	Greasing control unit
60-65/68	E1035_1	Connection box control valve
60-65/67	E1035_2	Connection box control valve
60-64/69	E1035_3	Connection box control valve
61-66/69	E1035_4	Connection box control valve
66/75/78-79	E1037	Connection box solenoid valve lad trap door
42/44/66	E1038	Connection box regulation
24/35	E1039_1	Emergency stop box control valve
82	E1043	Connection box grease full messag
102	E1051	Connection box hydraluic tank
101	E1053	Connection box genset
102	E1055_1	Connection box batteries
102	E1055_1	Connection box batteries
102	E1056	Connection box splitterbox
101/102	E1058	Connection box cabin
102	E1060	Connection box greasing

E1003 Haupt Kreis Versorgung:Klima,FSG / E1003 Circuit principal supply:Air conditioned,FSG







CAN S2 – A1001

Drehwerksbremse / Swing brake
Scheibenwischer / Windshield
Rundumkennleuchte / Warning beacon
Spritzwasser / Splash water
Arbeitsscheinwerfer / Working flood light
Heizung / Heating
Fahrscheinwerfer / Travel flood light
Schnellgang / Overdrive

CAN S2 – A1020 FSG

10% Hub / 10% Boom
10% Kipp / 10% Shovel tilt
10% Vorschub / 10% Crowd
10% Schwenken / 10% Swing
10% Fahren / 10% Travel
10% Klappe / 10% Trap door
10% B30 / 10% B30
10% Ausrüstung / 10% Attachment
10% Schwenken (ASW) / 10% Swing (ASW)
10% Fahren (AFA) / 10% Travel (AFA)
Vorschub Druckloses senken / Crowd pressure fall
Hub Druckloses senken / Boom pressure fall
Ponton / Pontoon
Drehwerksbremse / Swing brake

CAN S2 – E1036

Verschmutzung / Clogging
Überhitzung / Overheating
Getriebe Stand Min/Max / Gearing level Min/Max
Getriebe Druck / Gearing pressure
Getriebe Temperatur / Gearing temperature
Tankvorspannung / Tank pressure
Steuerdruck / Control pressure

CAN S2 – U16 BST

Qmin / Pump angle mini
Ausrüstung / Attachment
Fahren / Travel
Schwenken / Swing
B30 / B30
Strom Leistungsregelung (Y4) / Current regulation (Y4)
Strom Mengeregelung (Y3_1,Y3_2,Y3_3) /
Current rate control (Y3_1,Y3_2,Y3_3)
Fehler Kode / Error code
Klappschaufel Ausrüstung /
Bottom dump shovel attachment

In Schirm H1 und in Speicher (list E_elec)/ On screen H1 and in memory (list E_elec)

CAN 1

- E303 Keine Meldung zwischen S2 und BST / No message between S2 and BST
- E311 Keine Meldung E1036 (Translater) / No message between E1036 (Translater)
- E312 Keine Meldung zwischen S2 und E1036 / No message between S2 and E1036
- E313 Keine Meldung zwischen S2 und A1020 FSG / No message between S2 and A1020 FSG
- E320 Keine Meldung zwischen E1036 und Translater J1939 / No message between E1036 and translater J1939

CAN 2

- E305 Keine Meldung zwischen S2 und ESP01 / No message between S2 and ESP01
- E308 Keine Meldung zwischen S2 und Display / No message between S2 and display

In Schirm H1 und in Speicher (list E_elec)/ On screen H1 and in memory (list E_elec)

- E302 Kodierstecker / Coding plug m
- E319 Kodierung BST / Kodierung S2 / Coding BST n
- E321 Kein bekannte / Unknown exc
- E322 Keine Bekann / Unknown hard

kein Qmin beim Geber ausgestecktem Zustand / No pump angle to mini if transmitter disconnected

Qmin / Pump angle mini

- Hydraulikölstand / Hydraulic Oil Level
- Hydrauliköltemperatu / Hydraulic Oil Temper

Elektromotor / Engine

- Überhitzung Wicklung / Overheating winding
- Überhitzung Wicklung Phasen Ausfall Drehrichtung / Overheating windin Phase failure Direction of rotatio
- Überhitzung Lager 1 / Overheating bearing
- Überhitzung Lager 2 / Overheating bearing

Steuergerät Links Vorschub ausfahren / Control Unit Left Joystick Crowd extend